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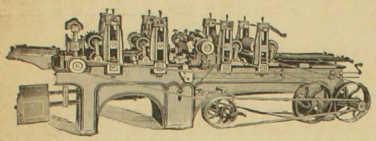

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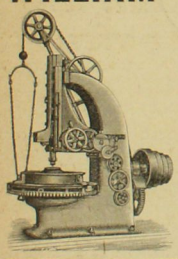

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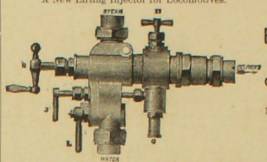

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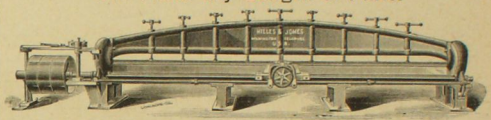

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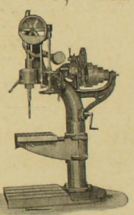

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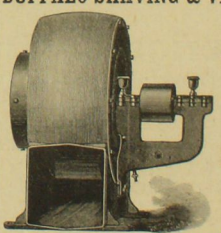

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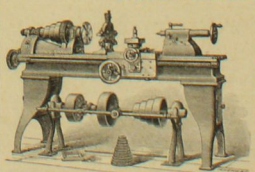

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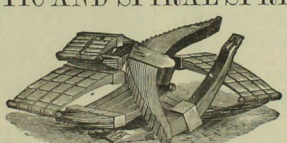

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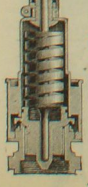

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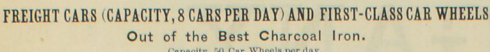

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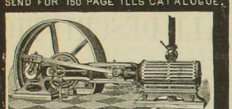

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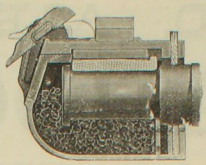

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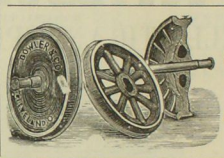

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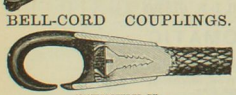

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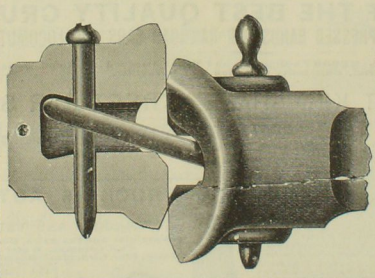

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Victory over more than 30 Self-Couplers in the Master Car-Builder's Convention of June, 1876. Also indorsement for safety in coupling by the Yard Masters, in their Convention, June, 1877, and by 300 others who were unable to attend the Convention, and 300 railroad officials who are resident in 26 States, and who admitted superiority over any other yet produced. Try 30 free of royalty, and see for yourself! Pattern free, and no change in timbers or connections. Those made by Wilson, Walker & Co., Pittsburgh, Pa., *will save 200 per cent. in repairs*, and give double life service over *old styles of* wrought iron. About 43,000 in use by 146 railroads. The *saving in repairs* by using *my invention* is from 20 per cent. to 80 per cent. as per *report o many officers.*

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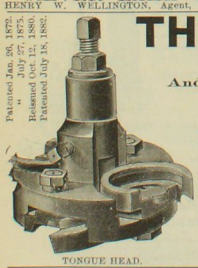
THE SHIMER MATCHER HEADS.

THE CHEAPEST! THE STRONGEST! THE MOST DURABLE!

And yet the Lightest and Easiest Running Matcher Heads in the World. Upward of 12,000 Sold.

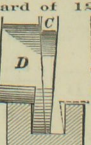
Patented Jan. 26, 1875.
" May 25, 1875.
Reissued Oct. 12, 1880.
Patented July 18, 1882.



TONGUE HEAD.

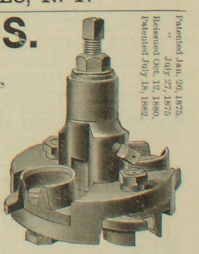
The Bits are arranged in upper and lower series, and secured to a Head having seats alternately inclined for the purpose of giving the side clearance to their cutting points. This explains why these Bits hold their shape and turn out standard work until used up; the entire circle of Bit being tool cutting edge.

This diagram represents a Bit (*D*) in the position it occupies when making a cut; the Bit (*C*) which follows to complete the work is given in outline. This ex



plains the division of cut and the free and easy working of the Tool. They finish hard cross-grained and knotty lumber neatly, showing clean-cut edges and often *save their cost in one day's run.*

We also make **Ship Lap Heads, Jointer Heads, Dado Heads, Sash Heads, Door Heads, Cope Heads** and Heads for any special work where a perfectly uniform pattern is required. Send for Descriptive Circular.



GROOVE HEAD.

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" July 27, 1875.
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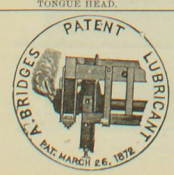

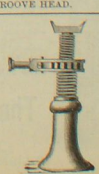

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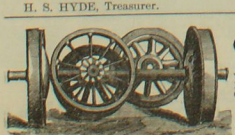

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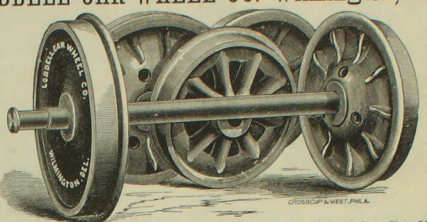

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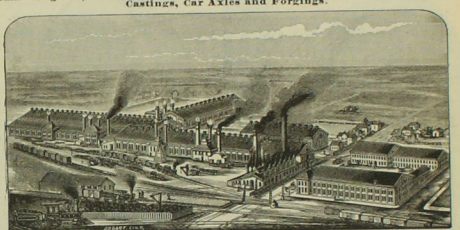

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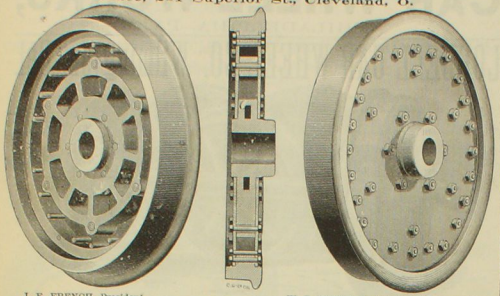

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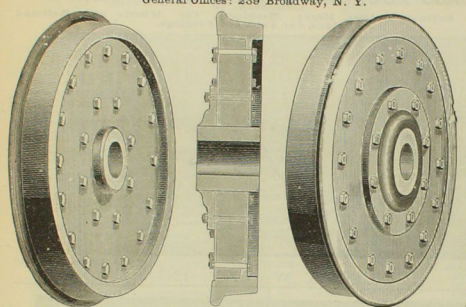

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Especially adapted for Sleeping and Drawing-Room Cars, Locomotive and Tender Trucks. Steel Tire with Annular Web—Strongest, Most Durable, and Most Economical Wheel in use. 71 manufactured in 1877; 60,000 manufactured to date; present facilities, 36,000 per year. Works at Hudson, N. Y., at Pullman, and at Morris, Ill.

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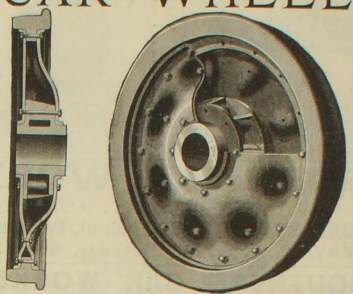
THE STEEL TIRED SPRING PLATE CAR WHEEL

HAS NO RIGID CONNECTION BETWEEN TIRE AND AXLE.



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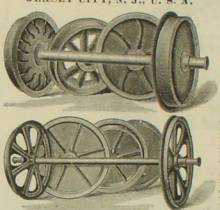
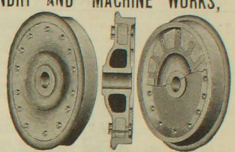


Wheels loose or fitted to Axles for every variety of Railroad service.



THE THOMAS PATENT STEEL-TIRED WHEEL.

The above engraving represents a new Steel-Tired Car Wheel having practically an indestructible non-metallic bearing for the tire, of sufficient depth to intercept and destroy the vibrations common to ordinary chilled iron car wheels, and steel-tired wheels in which the tire rests directly upon a metallic centre, thus producing a noiseless wheel and one securing increased life for the tire and axle.

This is accomplished by casting a centre having a series of pockets or recesses on its circumference, **opening outward**, formed by the back plate of the casting extending to the top of the pocket, and the front plate to about half the height of the pocket, and separated from each other by radial metal walls. Into these pockets are forced from the periphery of the casting wedge shape blocks of wood, so treated that there is no possibility of shrinkage or deterioration. The wooden blocks before insertion are of such size that the pressure necessary to seat them secures their retention in the pockets when the pressure is removed, and when turned off to receive the tire they extend slightly beyond the radial walls, the tire thus bearing only on wood.

To secure the tire to the centre, tapered bolts, fitted to reamed holes pass through the internal flange of the tire, the radial walls of the centre, and when so ordered, through a retaining ring at the back of the tire, and the bolts having a full metal bearing their entire length, hold more firmly than when allowed to pass through the cushioning material.

Attention is called to the wheel as one of few parts, to the facility with which it may be refitted with new tire, and that the life of the wooden bearing is measured by the number of times the casting will admit of refitting to axle.

The wheel is manufactured by The Jersey City Wheel Foundry and Machine Works.

For furtaer information address THEODORE THOMAS, P. O. Box 129, Jersey City, N. J.

CHILLED CAR WHEEL GRINDING CO., CARSON, NEVADA.

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The CHILLED CAR WHEEL GRINDING MACHINE, which we now introduce, is no hasty device. It is the result of four and one-half years experience, and during that time has received a most thorough test, with satisfactory results.

Railroad officials, upon reflection, will admit it is more essential to have a machine to true up Chilled Car Wheels than a Tire Lathe for turning locomotive tires, for this reason: four or more driving wheel tires are required for one engine; a greater number of Car Wheels compose a train; hence the necessity of this invention.

The great hardness of the chilled tread has hitherto rendered the operation of turning them impracticable, owing to the great expense, which made it cheaper to frequently replace the worn wheels with new ones. To obviate these objections and reduce the cost of this process, we furnish a machine capable of making a perfect wheel at small expense.

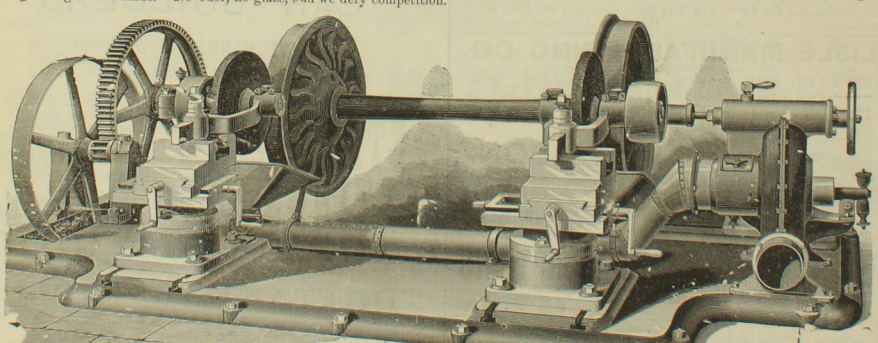
Wheels with flat places, and otherwise badly worn, that are ordinarily condemned and used for scrap iron, can be ground and fitted so as to double their original mileage. This alone makes our machine the greatest money saver ever introduced to railroads.

A sound Chilled Car Wheel trued by our method cannot be excelled by a paper or any other description of Car Wheel with steel tire.

Any person having a slight acquaintance with tools may, after five hours' instruction, become thoroughly competent to operate our machine.

Allowing all new wheels to be 3-32 inch oval, if properly fitted to axles, our machine *will* true up one pair an hour.

We manufacture expressly for use with our machine, Abrading Wheels, which, as the result of a series of experiments and long experience, we guarantee to be the best grinding wheels made. No odor, no glaze, and we defy competition.



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Chicago, Milwaukee & St. Paul Railroad,
Canadian Pacific Railroad (Yale B. C.),

Chicago City R. R., Cable Road,
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We are prepared to sell machines outright, or to furnish them on royalty for each pair of wheels trued.

THE ALLENTOWN ROLLING MILLS, Allentown, Pa., Manufacturers and Financial Agents East of the Mississippi River.

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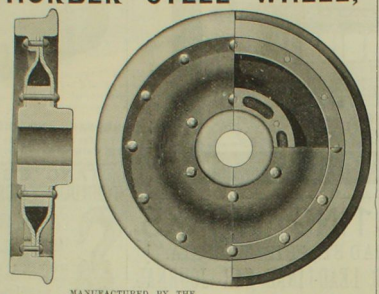
Fourth—Durability as a result of the general excellence of the wheel.



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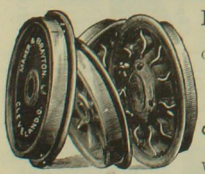

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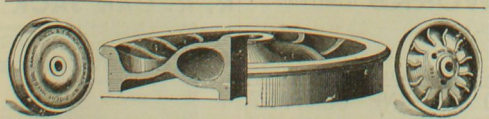

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Surpassing all other Nut-Lock Devices in
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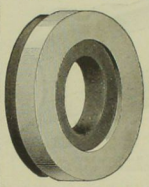
Strengthened and Protected from Weather.
Cannot be Crushed or Burst.
Will not Lose their Elasticity, nor Rot.
Adapted for both Plain and Angle-bars



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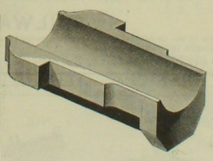

Oriental Metal is superior to all other metals known to the trade for general Machine Castings, and for Bearings of all kinds, Thrust Rings, Slide Valves, Cross-Head Gibs, Piston Rings, Pinions, Cog Wheels, Steam Whistles, etc., etc. Is anti-frictional. All Castings guaranteed. Price as low as any other leading metals.

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48 CONGRESS STREET, BOSTON. (WORKS: EAST BOSTON.)

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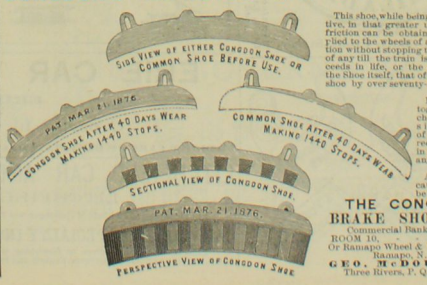

This shoe, while being more effective, in that greater uniformity of friction can be obtained when applied to the wheels of a train in motion without stopping the revolution of any till the train is at rest, exceeds in life, or the durability of the Shoe itself, that of the cast iron shoe by over seventy-five per cent.

Its durability, together with cheapness and simplicity of construction, recommend it in preference to any other in use

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GEO. McDOUGALL, Three Rivers, P. Q., Canada.

B. F. MASTEN, PREST. C. E. GORE, SUPT.

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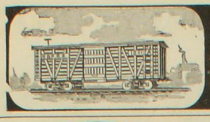
CABOOSE & REFRIGERATOR CARS. HAND & OF ALL KINDS.

WAREHOUSE TRUCKS & BAGGAGE BARROWS. CAR WHEELS & CASTINGS



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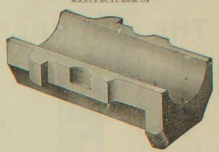

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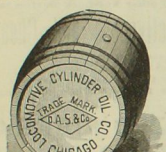

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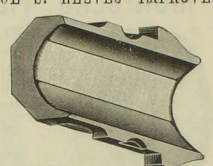
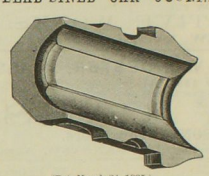


(Pat. March 24, 1885.)
Showing Chamber with Lining.



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The most satisfactory combination of hard and soft metal yet offered to Railroads and Car-Builders. **They have given entire satisfaction wherever used.** Send for sample set; and, if not satisfactory, no pay will be asked.

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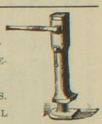

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ENGINE, COACH AND CAR OIL.

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No freezing in coldest weather, and entire freedom from hot journals at any time, as its exclusive use upon a majority of the leading railroads has demonstrated.

Showing Better Results than any Oil Extant

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NOTICE.—To build an efficient wrecking car, many of the main features of this car would have to be incorporated into it, which would be an infringement of my patents. Such cars are being built by the undersigned (having special tools for the work) at very reasonable prices, and no charge made for the patent rights, which would have to be paid for by the user if made by an unauthorized person.

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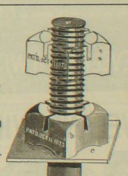

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a. Atwood Nut on bolt without bearing on base slots open.

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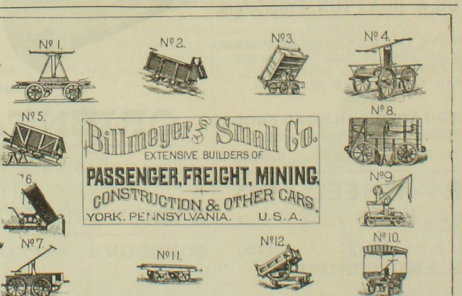

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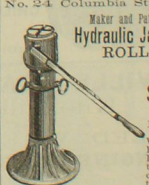

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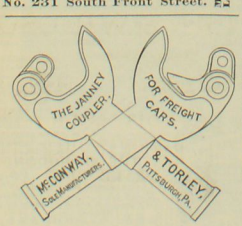

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Capacity 16 Cars Per Day.

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Especial attention is given to furnishing Hoisting Engines, Pit Cars, Dumps, etc., etc., for Coal Mines, as well as building Stationary Engines and Boilers, and General Brass and Sheet-Iron Work.

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By this jack cars can be raised or lowered at any desired speed. Will send on 30 days' trial to any railroad.

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Messrs. HOGELAND & ANDERSON,

Gentlemen: We have been using your jacks for nearly three months, with excellent results. O s r men prefer them to any other by long odds.

J. F. RICHARDS, Foreman.

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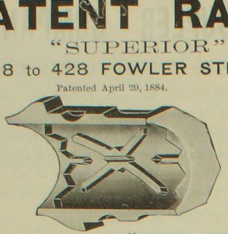
418 to 428 FOWLER STREET, - - - - - - - - - MILWAUKEE, WIS.

Patented April 29, 1884.



This Bronze Shell, filled with our "NICKEL ANTI-FRICTION," is producing immense mileage on all railroads now using, among them the Chicago, Milwaukee & St. Paul Railway, who have adopted over all others, and to whom we are pleased to refer by permission.

Our "Anti-Friction" Metal is UNSURPASSED as a lubricator, under any pressure, slow or greatest speed.

OUR "SUPERIOR BRONZE" we warrant unsurpassed by that of any other so-called Bronze or composition Metal for bearings and miscellaneous purposes. We will furnish this metal in Castings or Ingot, as may be desired, and respectfully solicit your correspondence. We have as large a Smelting Capacity as any Foundry in Brass and Bronze in the country, and are able to FILL ALL ORDERS PROMPTLY.

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This is a Solid Bored Bearing, containing grooves one-eighth inch deep for free distribution of oil in starting, thereby preventing many hot journals.

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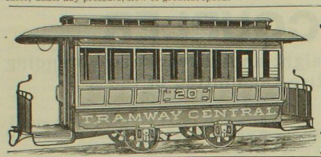

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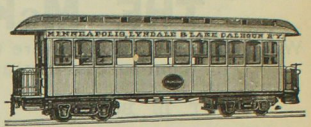

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And is Prepared to Build for LEASE and on Contract for CASH, or under the CAR-TRUST SYSTEM, such ROLLING STOCK as may be Required.

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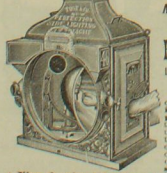
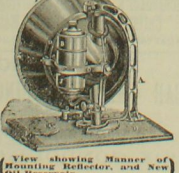
NEW PERFECTION SIDE-LIGHTING HEAD-LIGHT,
Largest AND BEST Head-Light MADE.



View showing Side Signals, Numbers and Nicholson's Pat. Colored Signals, with Reflector turned in position for lighting. No more lanterns required on Engines.

The New Reservoir is constructed on our American Student Lamp principle, which keeps the oil at a constant level until all is consumed, thereby saving 2 inches of each wick, and it overcomes the unsteadiness of the flame, caused by splashing of the large body of oil in the reservoirs of ordinary Head-Lights, out to be refilled.



View showing Manner of Mounting Reflector, and New Oil Reservoir.

This reservoir can be readily taken Send for Circular of
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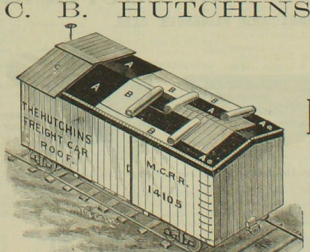

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Which carries a powerful Current of Air directly through the Urinal and Hopper on Passenger Cars and Steamboat Closets while in motion or standing, hence doing away with all mephitic odors, to the health and comfort of their patrons.

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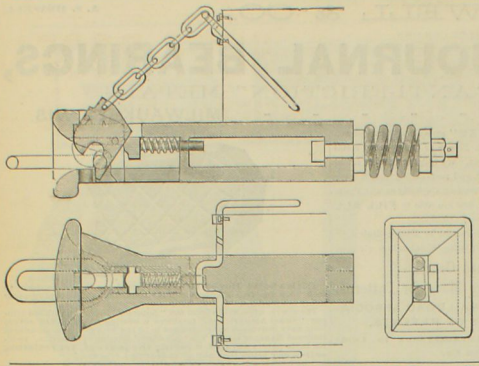
FOR 1880, 1881, 1882, 1883 AND 1884.
Price, - - - - - - - - $3.00 Each.



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The most complete, simple, durable and effective Automatic Freight Car Coupler. It is in actual and satisfactory use on some of the principal railroads. Automatic and certain, it insures absolute safety in coupling and uncoupling, and makes it unnecessary for trainmen to go between cars. It costs but little more than the ordinary link-and-pin coupling. It will couple to any draw-head, and can be adjusted to any draft rigging, or will take the place of any draw-bar now in use. We will equip cars for trial by any railroad desirous of testing the coupler on its merits. For full information, address

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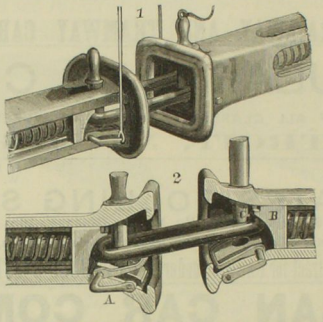
IT IS BOTH
AUTOMATIC AND SAFE.

This coupler has the great advantage of being **Automatic** when applied to itself, a perfect **Safety Coupler** in coupling with any Drawheads now in general use, there being no necessity for going between the cars to couple or uncouple.

It can be coupled or uncoupled from the top or platform of the car while in motion.

The construction of the Drawhead being so similar to the old Drawhead in general use, it has all the advantages of that, with its absolutely safety qualities, at a slight additional expense.

It saves the bending and breaking of Links and loss of Pins.



The Improvements can be put in old cast or wrought Drawheads with a hollow back or on the Locomotive at trifling expense.

It gives all the slack of the present system, and any length of Link can be used.

It is thoroughly protected by four patents.

It is in use on the L. V. R. R., in Cast Steel Drawheads; also in their Wrought Drawheads; and they have put on a large number in Cast Iron.

It has met the approval of H. S. GOODWIN, Gen'l Sup't, and JNO. S. LENTZ, M. C. B., and I refer by permission to them as to its practical and economic features, and as to doing what I claim.

Pairs of these Couplers will be sent to railroad companies wishing to give them a trial, ready fitted up to put on, free of charge, by application to the undersigned.

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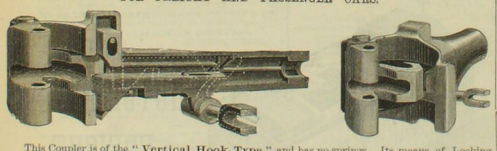
AUTOMATIC CAR COUPLER,

FOR FREIGHT AND PASSENGER CARS.



This Coupler is of the "**Vertical Hook Type**," and has no springs. Its means of Locking is Gravity.

Guaranteed to couple on the sharpest curves to cars of different heights and styles.

It requires no fitting—ready from the molds to apply to cars. Draw-bar weighs from 80 to 120 pounds in malleable iron, and from 150 to 180 pounds in cast iron. It is Automatic in locking and unlocking, and is always ready for use. Cheap, safe and reliable. Address

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STEEL RIVETS A SPECIALTY.

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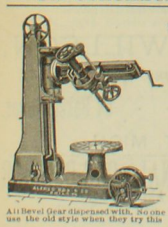

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ALL SIZES OF CHAIN TO RUN IN SPROCKET WHEELS.

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Double Screw Hoists, Radial Drills,

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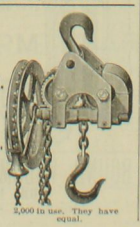

2,000 in use. They have equal.

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CLAIM FOR "AJAX METAL"

1st: 25 to 50 per cent. more mileage.
2d: 33⅓ per cent. greater tensile strength and 100 per cent. greater crushing strength.
3d: 20 per cent. less friction and wear upon journal.
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Castings made to order as per patterns received.

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PASSENGER MAIL, BAGGAGE

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AND ALL OTHER KINDS OF

RAILROAD CARS;

Railroad Car Wheels and Castings, Bridge and Rolling Mill Castings, Bridge Rods, Bolts and

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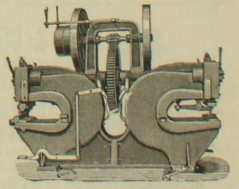

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We make over 100 sizes of Punches and Shears, Double and Single, varying from 500 to 30,000 pounds in weight, and adapted for every variety of work. The Double machines are equal to two Single ones, as each side is worked independently. Also

ADJUSTABLE HELVE CUSHIONED HAMMERS

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Absolutely Water-tight.
Proof against Storms, Snow and Ice.
Can be put on by anybody.
Adapted for all classes of Buildings.
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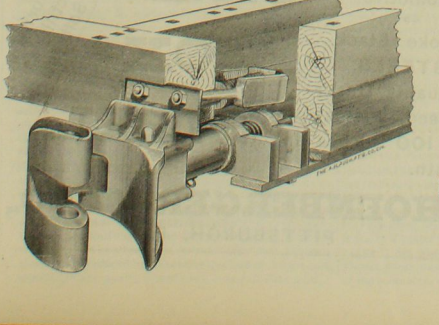

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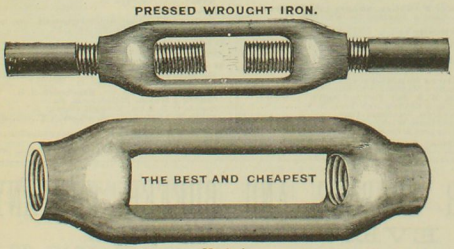

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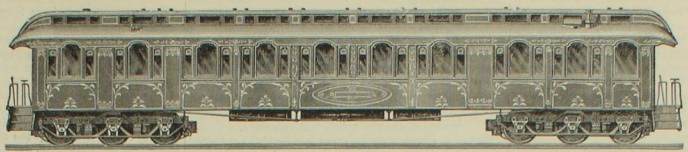


DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

VOLUME XVI. NUMBER 11. | NOVEMBER, 1885. | SINGLE NUMBERS, TEN CENTS. $1.00 PER ANNUM.

Miscellaneous Items.

THE rosewood used in the Pullman Car Works costs $600 per thousand feet.

THE Denver & South Park Railroad Company are about to order seven new locomotives.

CAST steel piston heads are being put in some locomotives that are being built for the Missouri Pacific Railroad by the Baldwin Locomotive Works.

THERE are nine lumber-drying kilns at the Pullman Car Works, each having a capacity of 30,000 feet. Green wood will dry in them in five days so it can be used in car building.

THE Baltimore & Ohio Railroad Company, and the Chicago, Burlington & Quincy Railroad Company, have introduced examinations for color blindness among their employés.

DURING the month of September, no boiler explosions were reported as having happened to any boiler connected with railroads; but sawmills and threshing machines kept up their evil reputation for having the bursting kind of boilers.

THE sleeping car La Sonnambula, belonging to the Mann Boudoir Car Company, is in the Pullman car shops undergoing a general repair. The car has been in service only two years, but during that time was subjected to very hard service.

AS to the relative merits of hard and soft steel rails, the latest testimony in Germany leaves the matter of wear indeterminate, with the conclusion that the wear of the rails depends more upon the impurity of the steel than upon its hardness or softness.

INDIAN State railway engineers have devised steel sleepers hollowed like a dish, and strong enough for any call that may be made upon them, and yet as light as the old wooden sleepers. They are each 120 pounds weight, and are practically indestructible.

ONE of the English railway companies has supplied all of its employés with red neckcloths, the wearing of which is to be compulsory. The object of this regulation is to furnish porters, guards and switchmen with red flags that are always in readiness for use in emergencies.

IT is said that $3,500,000 have been pledged for building the Highland Junction Railroad, including the Storm King bridge across the Hudson, and that an effort is on foot to induce the Baltimore & Ohio and its southwestern connections to raise the $2,500,000 that is yet needed to secure the success of the undertaking.

EX-CONGRESSMAN W. D. Washburn has been traveling in Europe for some time, and has returned very much disgusted with some old country institutions. In the course of an interview he said that the third-class cars are so bad in Europe that a hod-carrier in this country would not travel in them. They are mere boxes put together a little better than cattle cars.

THE 40,000 pounds box car is getting to be exceedingly popular on many Western roads, and the demand for cars of that capacity is becoming so urgent that some roads do not wait to build new cars or rebuild and strengthen old ones in order to meet this demand. A much quicker and cheaper plan is followed. When a box car goes into repair shops it may be marked for a capacity of 25,000 or 30,000 pounds, but when it comes out it is invariably marked to carry 40,000. The man with the paint brush is hurrying on increased capacity of cars much more rapidly than the car-builders are. It is a cheap way of making the change, and pleases freight agents first-rate, but the plan is not always very economical in its final results. A goodly percentage of cars subjected to this magic increase of capacity find their way into the ditch—they appear to seek that means of getting a rest—and the call for running repairs is increasing enormously. Questioning a car repairer the other day as to what part of the car suffered most from the great increase of loads, he insisted, like a true Irishman as he was, that all parts suffered worst alike. The body of the car, the draft apparatus and the trucks all appear to suffer badly and need heavy repairs. A ramble round any repair yard in the West will soon convince an observant railroad man that the additional money earned by increasing the load of freight cars, especially those poorly constructed, is not all clear gain.

Shop Notes.

PULLMAN PALACE CAR CO.

A superficial look round the numerous shops which constitute the bread-winning portion of the city of Pullman, would lead to the impression that the works were very busy, for the number of workmen to be seen hard at work are very numerous; but on close inspection of the shops, we find benches with none of the traces of daily labor upon them, machines idle and building tracks unoccupied. To be sure, these traces of dull times are not very numerous, but they are sufficient to indicate that business is not rushing, or that it continues to be considerably within the capacity of these immense works. These works are very well arranged for the handling of material and the finishing of the various constructive operations at low cost, but they are not ahead of several smaller car shops that receive little public attention. Intelligent system of production, cleanliness and order appear to rule supreme within the establishment. Machinery is used for every purpose of wood-working to which it has ever been successfully applied, and no manual labor is expended in handling anything where power can be used. The system of cleaning up sawdust, chips and shavings by hoods attached to pipes connected with an exhaust blower, is very successfully carried on in all the shops where wood-working machines are running. The principal planing mill is the cleanest shop of the kind we have ever seen, all the dirt being carried away unseen as it is formed.

It did not appear to us that the shops for the working of iron were so perfect in their equipment as the wood-working shops, but it is undeniable that car shops are away behind those devoted to the building of locomotives, in the perfection of iron-working machinery, and the methods of finishing metal work. This struck us very forcibly while watching four men putting together the pieces of iron trucks of the Chicago, Burlington & Quincy Railroads' standard freight car pattern. This was in the blacksmith shop, which is very well provided with formers and special tools, every forging of established size being worked into shape by labor-saving appliances. There are specially good facilities for bolt-making in these works. The machinery for transforming bar iron into finished bolts and nuts is all grouped together with admirable facilities for transferring the material. Six bolt-making machines are kept at work, and each machine has a furnace beside it where the bars are heated. The product of the bolt and nut machines keep twenty thread-cutting and five nut-tapping machines busy. These are placed in close proximity to the bolt-making machines, and handling is reduced to a minimum.

The company have just completed the work of an order for 2 passenger and 7 baggage cars for the New York, West Shore & Buffalo Railway. The passenger coaches are made to seat 64 persons, the length of car being 57 feet 6 inches, and the width 9 feet 8 inches over sills. The height from top of sill to under plate is 6 feet 6 inches. The Pullman standard and wide deck roof is used, with oak ceiling. The inside finish is mahogany. The seats are of the Mason patent, covered with maroon plush. Trucks of the Pullman standard, with 42-inch Allen paper wheels, are used under these cars.

They are building 30 cars for the Staten Island Rapid Transit Co. These cars resemble in many respects those on the elevated railroads of New York. The cars are made to seat 48 passengers, the seats being arranged with two double seats put crosswise at each side in the middle of the car, the others being placed at the sides with the sitter's back to the side of the car. Rattan seats are used. The cars are neatly finished in oak inside, with mapel paneling inside the roof. Four-wheel trucks with 33-inch Allen paper wheels are used.

A very handsome sleeping car is under construction to replace a sleeper belonging to the Atlantic Coast Line, which was burned. The car is 64 ft. long, with Pullman standard framing and roof. The flooring is of yellow pine, the ceiling of maple and the inside finish of mahogany marquetrie design. High back seats are used, covered with maroon plush, having spring edges. All the trimings are silver plated. The new Baker heater is used and is put in a heater room with the coal box beneath the heater. Six wheel trucks of the Pullman standard, with 42-inch paper wheels carry the car. Three more sleepers of the same style will be built for the same company.

In addition to the passenger cars mentioned, the company have under construction part of an order for 60 cars for the Broadway Street Car Company, of New York, and 25 street cars for the Chicago Passenger Railway Company are in progress. Very handsome street cars they are, too; more elaborate in finish than the Broadway cars, but something in the same style, the color being an imposing yellow. There are two sleepers for the Richmond & Danville road that resemble in many respects those for the Atlantic Coast Line; one is also being built for the Pennsylvania Railroad Company, and one for exhibition at New Orleans. In addition to their standard sleeper, the Pullman Company are getting out for the New Orleans Exhibition 1 first-class passenger car, 1 second-class passenger car, 1 mail and express car and 1 street railway car, all of their standard patterns. The Brunswick & Western Railway Company have 2 passenger cars under way here; the Florida Southern are getting 2 baggage cars and the Terre Haute & Indianapolis 2 chair cars. In the way of stock, the Pullman Car Company are building 6 sleepers. They are also getting ready to build 35 passenger and baggage cars for the Chicago, Burlington & Northern road.

The works are engaged on an order for box freight cars for the Kansas & Gulf Short Line, and on various kinds of freight cars for the Chicago, Burlington & Quincy. The latter include box, stock and flat cars, and all have the company's iron standard truck that is good for any 40,000 pounds load. All these cars have heavy Potter draw-bars. The company were getting ready to begin on the order for 2,200 freight cars for the Chicago, Burlington & Northern.

In connection with the freight car work done here, we were struck with a convenient arrangement of the tracks where the trucks are built. The track is raised about 14 inches above the floor, which gives the workmen the advantage of a pit without its inconveniences.

CHICAGO & NORTHWESTERN RAILWAY.

The car shops of this road are quite busy with repairing, and there is also considerable new work on hand. They have just completed 16 stock cars, 16 box cars, 12 coal dumps and some flats. They are now getting out material for 18 box cars. They are building two combination cars for passengers, baggage and mail, and a sleeping car that got the side knocked in is being rebuilt. The force at Wood street car repair shops has been considerably increased. Work is rushing on the road, and when that is the case there is plenty of repairing to do, with the heavy loads now carried.

There are 13 locomotives in the machine shop undergoing repairs, but no work of a heavy character is being done there. The motive power of the road is in such good order that a light force can do all the repairs necessary. They have recently received from the Schenectady Locomotive Works a new ten-wheel engine with the fire-box on top of the frames. The engine is intended for heavy grades that have sharp curves, this form of heavy engine being selected on account of the short wheel base permissible with the bottom ring of the fire-box above the frames. The engine has done very well in service, and Mr. Tilton, Superintendent of Motive Power, thinks that the careful firing rendered necessary with the shallow fire-box will have a good educational effect upon the firemen.

WABASH, ST. LOUIS & PACIFIC.

The shops of this road, at Toledo, have been allowed to run down for several years, till they became almost unfit to work in, and badly adapted for doing work economically. A new Master Car-Builder has recently taken charge there, and things are assuming a different appearance. New floors are being put in the freight shops, the paint-shop, and the planing mill. New sky-lights are being put in the whole length of the paint shop in answer to a long echoed cry for more light in that establishment. A general cleaning up has been going on in drains, water closets and yards, and the result will soon be apparent in the improved health of the men. Under this ordeal, large quantities of scrap that has been accumulating for years has found its way to the cupola, the forge and the furnace, and room is made for material required in doing work. They are turning out considerable new work, both passenger and freight cars, and the repair work is getting heavy. The outlook for a very busy season is good.

ILLINOIS CENTRAL.

Mr. Schlacks, the Superintendent of Machinery, has got out three of his new passenger engines. They have cylin-

ders 17 × 24 inches, driving wheels with $57\frac{3}{4}$ inches centers, and boilers 50 inches diameter at the smallest ring. They are equipped with all the most approved appliances for convenience in handling and for promoting economy. One innovation over other engines on the road is the Ashton blow-back, which has been put on all the new engines. The tenders, which are made to hold 3,000 gallons of water, are carried by Thielsen trucks, the regular pattern of the road for heavy freight cars. These engines were run two weeks without any lagging on the boilers, the purpose being to have the seams perfectly tight before the permanent covering was put on.

CHICAGO, ROCK ISLAND & PACIFIC.

The car shops of this road are quite busy with repair work in both passenger and freight departments, but very little is going on in the way of new work. Mr. Verbryck is building one new passenger car to replace an old one worn out, and nearly rebuilding another that needed general repairs, both of which will be standard coaches when finished. In freight work he is rebuilding one 34-feet box-car, and about one flat car a day, to replace cars worn out and destroyed, and to keep up equipment, but no orders are in for building new freight cars.

In the machine shops, Mr. Twombly is building six new eight-wheel engines, with cylinders 17 × 24 inches and boiler 54 inches diameter. These large boilers are straight, with the dome advanced to admit of the fire-box being stayed direct to the outside shell. The boiler shell is made of $\frac{7}{16}$ inch steel, the outside shell of fire-box is $\frac{1}{2}$ inch steel, with only one seam on top. The inside of fire-box has crown and side sheets made from a single sheet. The flue sheets are $\frac{1}{2}$ inch thick. These engines will be 4 tons heavier than the locomotives previously built, the principal increase of weight being in the boilers. The frames are slightly increased in weight.

All the engines belonging to the company have now got sight continuous lubricators for the cylinders. Mr. Twombly believes that no single improvement effected for years, has given a better return for the investment than the outlay for sight lubricators. During the past year, the company have put $50,000 worth of new machinery into their Chicago shops. That is another sort of investment they expect will yield good returns.

PITTSBURGH LOCOMOTIVE WORKS.

They are building a large foundry in connection with these works, which is likely to be the best arranged and equipped establishment of the kind in this country, when finished. It was expected that the foundry would be in running order this fall, but the builder has fallen behind with his work, and the prospects of getting the roof on before snow flies are dubious. The works are building some engines for the Missouri, Iowa & Nebraska road, and some for the Jacksonville & Atlantic. The boiler shop is busy on orders for stationary and marine boiler work. They are building some hoisting machinery in the machine shop, and between that and the locomotive work, keep a fair force of men busy.

BALDWIN LOCOMOTIVE WORKS.

During a recent visit to these works, at Philadelphia, we found they had 12 engines of various sizes and classes in the erecting shop, and that they were doing considerable work, more than they had been doing for several months. To judge from the appearance of the boilers in these shops, we would conclude that the practice of building straight boilers with the dome put forward to permit the crown sheet of the fire-box to be stayed direct to the outside shell, is rapidly becoming popular. An odd form of engine in the shop was a tank engine for the Port Blakely Mill Company. It had four coupled drivers in the middle, with a pony truck in front and another behind the fire-box. This engine is equipped with a double-cylinder steam hoisting winch, which is fastened on the deck in front of the smoke-box. Steam to operate the winch is taken from the boiler of the locomotive. There was a small wood-burning engine ready for shipment for a 2-feet 6-inch gauge road that is built on a plantation in Cuba. The engine had 6 wheels coupled, and a pony truck under the deck. The Richmond & Danville Railroad had some consolidation engines nearly ready. They are exceedingly heavy engines, as they weigh 55 tons. They stand very high and have the fire-box above the frame.

The portion of the shop that was burned last year is now in full running order, and is full of the most modern machine tools, excellently arranged for getting out work accurately and quickly. There are now many tools in this part, made for special work connected with locomotive building. Among these is a hydraulic press for forcing piston rods into the head, doing away with sledging. There is another hydraulic press for straightening guides that have been sprung in hardening. A great deal has been said of late about the utility and economy of cast-iron guides, but, somehow, very few of them are turned out of contract shops, although we would suppose that makers would prefer to put on the cheap cast-iron guide rather than the expensive article made of good iron, case-hardened. The machine for straightening guides can put, by gradations, a pressure of 2,000 pounds per square inch upon any part. A small hydraulic press, made specially for the purpose, is used for forcing bushings into glands and similar work. With this press the operator can tell how much power he is applying, which prevents the incipient fractures so often caused where blind, unmeasured force is employed. There is an ingeniously devised special tool for drilling the holes in the heads of driver brakes, and it alters the position of the hole to suit the size of the wheel. An overhead carrier is secured round the second story of the newly-built shop where the guides, cross-heads, piston rods and such work, is finished. Formerly it kept three men busy moving material to and from this floor, but by means of the power carrier one man can now do the work easily.

WILLIAM SELLERS & CO., PHILADELPHIA.

During a recent visit to these admirably conducted works, we found they were not doing so much on current work, as they were preparing to handle in an improved fashion the work that will come so soon as business improves. They have made some important changes in the iron foundry lately. They have built an overhead traveling crane that traverses the whole length of the shop and dispenses with the use of all the swing-cranes. The increase of room and light by this change, is important in a foundry that turns out a great deal of work of all shapes and sizes. The crane has two trolleys which lift 13 tons each. They are worked in concert and can lift the heaviest flask in the shop. The crane is worked by a square shaft traversing the whole length of the shop, and the weights put on are self-sustaining. As promptitude in handling flasks filled with molten metal is an important consideration in a foundry, some doubts were expressed about the speed of a traveling crane being fast enough for such work, but use has shown that this crane meets all requirements. It is traversed at a speed of 120 feet a minute, which is the fastest speed we know of such a machine being geared to run. Does any one know of a faster traveling crane?

MORRIS SELLERS & CO. (CHICAGO SPLICE BAR MILL).

These works are busy filling a large order for their Samson Splice Bar for the Wisconsin Central Railroad, and other smaller orders make the outlook for a busy winter very favorable. Every indication goes to show that this splice bar, made on a sound mechanical principle, is forcing its way into public favor by the way it stands intact where other kinds of rail fastenings are continually breaking. The mill where the splice bars are made is very well provided with special machinery for doing the work. The operations of cutting off, straightening, punching the bolt holes, and slotting the spike notch, are done very quickly in machines designed to save time and labor in handling. Great care is exercised in the inspection of the bars, and we observed hundreds of bars thrown into the scrap pile for small floors. We have seen new track put together with bars, very few of which were so good as the average of this scrap pile. We observed some curiosities in the shape of old rails round the yard of this mill. There were several pear-headed rails, a pattern that came into use years ago, and of which great things were expected in the way of long service; but, like many other great expectations, they never were realized. Another great expectation rail was represented by several pieces; this was an iron rail with a steel cap. The Bessemer process ruined the prospects of that rail. Several lengths of the compound rail were lying round waiting to be worked up. The compound rail was made up of two slabs riveted together. In fact, each half was the same shape as half of a common T-rail split vertically through its length. How it was expected that these two parts would be stronger after they were punched with rivet holes to provide the means of holding them together than the same material would be if rolled solid, is one of the mechanical mysteries no other fellow can understand. A great deal is said of late about the necessity for having car wheel treads made uniform. A visit to this splice bar mill reveals some necessity for missionary labors in introducing uniformity in rail sections. This mill keeps over 150 different patterns of rolls, so that the splice bars may be made to fit the rails of different sections belonging to the company's customers. And they are still making new patterns of rolls to meet the changing demand.

TUBAL SMELTING WORKS, PHILADELPHIA.

Paul S. Reeves, the owner of these works, is turning out some extremely heavy brass castings, and his facilities for producing this kind of work are very good, indeed, for a shop that looks rather unimposing outside. We saw rolls 2 × 8 feet newly cast for paper machinery, and they were as clean and flawless as any moderate sized brass casting. He is working on a large order of brass pulleys for an overhead wire cable railroad. Large quantities of the Reeves improved lead-lined car bearings are being turned out to meet the growing demand for that kind of bearing.

THE recent sale by the South Branch Lumber Co., of Chicago, to the Pullman Palace Car Co., of four million feet of car stuff—sills, flooring, siding and roofing—is a notable event in the lumber market of that city. The *Northwestern Lumberman* says that it will make a great cavity in the classes of lumber required, including both Norway and white pine. Strips enter largely into the bill, and the stocks all over the district will be powerfully drawn upon. The placing of this large amount of lumber comes at a time when strips are being frequently inquired for, and it is beginning to dawn on the minds of dealers that there is no surplus of this class of lumber on hand.

Material Used for Boilers and Fire-Boxes.

Persistent attempts have been made during the past year or two by a railroad paper to lead master mechanics to believe that many of their contemporaries are abandoning the use of steel plates in fire-box and boiler construction, and that those who are not returning to the use of iron ought to be doing so. The Master Mechanics' Association at its last meeting unanimously passed a resolution recording the belief that steel was the best material for locomotive fire-boxes, but that did not silence the paper referred to, for it kept up the fight against steel, and declared that the Association did not represent the mechanical practice of American railroads. If a lie is uttered often enough, a great many people will come to regard it as a truth, and this was the case with the continued assertion that steel was being rapidly displaced by iron for fire-box construction. The assertion was making many master mechanics uncomfortable. To find out the exact truth of the matter, we addressed letters to the leading master mechanics of the country, asking what material they were using in the construction of boilers and fire-boxes, and we publish below the gist of the answers. We have no axe to grind; we only desire to find out the truth.

Mr. R. D. Wade, Superintendent of Motive Power of the Richmond & Danville Railroad, writes:

My experience with steel fire-boxes commenced in 1869, with two locomotives built by Rogers Locomotive Works. Fire-boxes of both these locomotives are still in service and in good condition. Since that time we have built and bought 98 locomotives, all with steel fire-boxes. I have never yet had to replace any of these boxes, and out of the lot there has been only one cracked sheet, except some small cracks from rivet holes out to calking edge. It is true, that until the last four years wood was the fuel used in all of these engines. It is the fuel used now in about one-third of them, and probably with coal from the commencement of service, the record would not have been so good. I am satisfied, however, that iron fire-boxes would not have shown as good results, and I should regret very much to be compelled to go back to them.

Mr. Geo. W. Stevens, Superintendent of Motive Power of the Lake Shore & Michigan Southern Railway, writes:

Referring to your favor 5th inst., would say, that steel, having been found to give the best results, is used exclusively.

Mr. Josiah Bettis, Master Mechanic of Louisville, New Albany & Chicago Railway, writes:

I have used steel exclusively for locomotive boilers and renewals of fire-boxes for the past ten years, with most favorable results. Iron, in my judgment, does not compare favorably in any respect with steel as a material for boilers.

Mr. W. F. Turreff, General Master Mechanic of the Cleveland, Columbus, Cincinnati & Indianapolis Railway, writes:

Replying to your inquiry of the 5th inst., asking my opinion as to the relative value of steel and iron for locomotive boilers and fire-boxes, would say, that in my experience steel is much preferable to iron. When I used iron I experienced constant trouble with fire-box sheets blistering and material otherwise defective, which satisfied me that it was not suitable for such service. I have been using the Otis steel for locomotive boilers and fire-boxes for the past twelve years, which has given entire satisfaction, and I have no desire to go back to the use of iron.

Mr. J. Henney, Jr., Superintendent of Motive Power of the New York, New Haven & Hartford Railroad, writes:

We are using Otis steel for boilers and fire-boxes with good results. We are using the Buchanan fire-box for all of our passenger engines. We flange the large hole so that any sheet that is exposed to the fire is protected by water on the other side.

Mr. S. D. Bradley, Master Mechanic of the Grand Rapids & Indiana Railroad, writes:

This company has been using only Otis and Shoenberger steel. The quality of both is excellent. We have had no trouble whatever. I cannot understand why the question of comparison should come up at this late day.

Mr. A. B. Underhill, Superintendent of Motive Power of the Boston & Albany Railroad, writes:

We use steel for boilers, fire-boxes and tanks. We have had failures, but the cases are rare. The failures are with the fire-box plates, and have always happened when the engine was nearly cold, and is due to unequal contraction. We are very careful about cooling our boilers suddenly, never filling a warm boiler with cold water. Our water is pure. The first steel fire-box that I made and used was in 1869. The steel was Hussey, Wells & Co. crucible, and the plates three-eighths thick. The locomotive has been running ever since on a passenger train using bituminous coal, and there has never been a cent expended on the fire-box. I should just as soon think of returning to iron tires as to iron boilers and fire-boxes.

Mr. T. Downing, Master Mechanic of the St. Paul, Minneapolis & Manitoba Railway, writes:

We have used steel almost exclusively on this line since its value as a boiler material has been recognized, and have found the results satisfactory. We do not contemplate a change to iron, at least at present, or until we know more on the subject.

Mr. T. L. Chapman, Superintendent of Motive Power, Chesapeake & Ohio Railway, writes:

Your favor of 3d at hand in reference to the relative value of iron and steel for locomotive boilers. I regret that I cannot give you some data worth publishing on the subject you have taken up. Our boilers being made of iron, and not building any ourselves, does not place me in a position to give an opinion as to which of the two metals would give the best results. We have very little trouble with our boilers, being blessed with a good quality of water over the greater portion of the line, which of course tends to reduce the cost of boiler repairs.

Mr. John Player, Master Mechanic of the Central Iowa Railway, writes:

I cannot say aught against steel as compared with iron for fire-boxes in locomotives. We put the first steel fire-box in one of our engines five years ago last May, and have been using nothing but Otis fire-box steel for that purpose from that time till date. We have in service at present 30 engines with steel fire-boxes, and have yet to find the first crack or bulge in any of them except one, and that one was mud burned while loaned to a construction company. They were using the engine for six weeks at a point where they could not wash out or even change the water. All the clearing out she got was by the engineer filling her up through the injector and blowing out at blow-off cock. That fire-box cracked in several places, and needed some pretty large patches. I might add they were using water siphoned from sloughs and ditches, as is usual in construction work.

We have in busy times run our engines very hard, some of them running for weeks without cooling, or cooling on the quick plan of blowing off steam and starting cold water into them before let-

ting the hot water out, and then opening the mud plug holes (or one of them), the water going into the boiler right from the hydrant and out at the hole for wash-plug till the boiler was cooled off ready for washing out. The hydrant hose, of course, is coupled on to the feed pipe, and water passes through the injector into the boiler. Service like that is hard on any fire-box, still we have had no trouble, nor have we found any defect. I don't advocate that plan, would rather let the boiler cool gradually; but under the circumstances it was all we could do in order to keep the engines running.

Now, going to extremes, will tell you what happened to the first steel fire-box that I put in service, and at the time made me feel nervous as to the result. It was in the month of February, 1881. The engine ran off the track in a snow-drift during one of the worst blizzards that ever blew (I believe you know what an Iowa blizzard means), and the engineer failed to get the water out of the boiler. The engine remained in the drift for two days before we could get to it, and was frozen solid. I expected to have a heap of trouble when the engine was thawed out, but was agreeably disappointed in finding nothing wrong but a slight swelling on outside of boiler leg, and that the flues needed rolling out. We have tested fire-box steel by all the known methods of the craft in the shop, such as bending cold and straightening back, drilling hole and driving in taper drift, etc.; and under any circumstances steel has stood more pounding, bending and twisting than iron without breaking. What its life may be compared with iron I cannot say, having had it in use only five years, while we have some iron fire-boxes 14 years in service. I believe that the kind of water used has much to do with service of a boiler, as does also the keeping of them clean; but am satisfied that on this road steel fire-boxes have given very good satisfaction.

Mr. G. H. Griggs, Master Mechanic of the New York, Providence & Boston Railroad, writes:

I have used the best iron (such as Low Moor and Sligo) for fire-boxes, and could not depend on it on account of its blistering. I have always had good success with steel. For outside boilers I never had any trouble with iron. The steel now made for boilers I consider the best for inside or outside, it being a semi-steel and iron.

Mr. Wm. Buchanan, Superintendent of Motive Power and Rolling Stock, New York Central Railroad, writes:

Until 1874, I had used iron and some steel of foreign make for boiler and fire-boxes. At that time I commenced using steel of American make for such purpose. My experience thus far has been entirely satisfactory in the use of steel, and I consider it in every way superior to iron for both boiler and fire-boxes. Up to the present time, I have used probably 6,000 or 7,000 plates, with so few failures that it is not necessary to mention them. Very frequently, while using iron, we would lose about one out of every three plates in flanging, resulting from the looseness of the metal, and the boiler would need patching; and a so-called new boiler would be only a patched boiler after completion. Another objection to iron for fire-boxes was that the sheets would become blistered, and after not more than three months' service would have to be patched. Since using steel there has been but one or two instances where the metal blistered. One advantage in steel over iron is that the metal does not draw in working, but retains about its original thickness. Another advantage is that in the cylinder part of the boiler, on lower side, where sediment collects, there is not so much grooving of seams and pitting, an action which causes the boilers to weaken continually on the inside, but does not show on the outside. I send you also the mileage of some of the steel fire-boxes lately removed from engines that are running in through passenger and freight service:

Passenger.	Freight.
619,440	385,753
563,731	313,973
545,547	285,307
509,485	280,949
546,758	205,660
455,747	
417,033	

Mr. C. H. Warburton, Master Mechanic of the Cleveland, Lorain & Wheeling Railroad, writes:

In my experience with iron and steel, I have noticed that the expansion and contraction of a locomotive boiler shell does not have so much effect on the seam on the bottom of the boiler with steel as when iron is used. I have known in iron shells, the seam to crack along where the calking was, but never noticed that with steel. I would prefer iron for fire-boxes, if good iron could be had, on account of its not cracking, as steel is liable to do. Steel, on the other hand, does not blister, a trouble often experienced with iron. On the whole, I prefer Low Moor iron for fire-boxes and steel for shell.

Mr. William Fuller, Superintendent of Motive Power, New York, Pennsylvania & Ohio Railroad, writes:

Referring to yours of 6th inst., relative to the question of steel and iron for fire-boxes of locomotives, etc., so far as the N. Y. P. & O. R. R. is concerned, will say that we have 241 locomotives, and out of that number we have about 20 iron boilers with steel fire-boxes. The balance of our boilers (221) are all made of steel, both boiler and fire-box. We have been using a mild steel for fire-boxes during the past eighteen years, and consider it preferable to any brand of iron that is made at present for fire-boxes, and we have no idea of going back to iron for fire-boxes in the future. We are making all new boilers out of steel, exclusively, and consider it superior to iron in every respect.

Mr. J. S. McCrum, Master Mechanic of Kansas City, Fort Scott & Gulf Railroad, writes:

We have 37 locomotives of our oldest equipment with iron boilers and steel fire-boxes; 71 of our locomotives, built at various times during the last five years, have steel boilers and fire-boxes. So far, the results with steel are satisfactory, and we are still using it, and have not tried iron for fire-boxes.

Mr. George Hackney, Superintendent of Machinery of the Atchison Topeka & Santa Fe Railroad, writes:

We are using nothing but steel here for boilers and fire-boxes. While it has some disadvantages in cracking if it is high carbonized steel, we have not been troubled with that on our road. The reason we substituted it for iron is, we were never known to have any blisters on steel, but seldom used iron without blistering; these are the principal reasons why I advocate steel.

Mr. G. F. Wilson, Master Mechanic of the Minneapolis & St. Louis Railway, writes:

In reply to your favor of the 5th ult., in which you ask for information concerning the relative merits of iron and steel used in boilers and fire-boxes, which has come under my notice, I beg to state that though my experience compared with others is limited, yet I certainly give preference to the use of steel for those purposes, and I would consider a return to iron as a move in the wrong direction. If I remember rightly the principal reason for the discontinuance of the use of the latter metal some years ago, was on account of its tendency to blister. About three months ago, I decided to experiment on an iron fire-box, and directed the foreman to flange the door sheet first. When he had it about half completed he called me to look at it, when I found a blister 20 inches square. This convinced me that the same defect existed in the present as in the past, and I concluded to continue the use of steel. We are using Otis steel for fire-boxes, and semi-steel for flues, with excellent results, and so satisfactory has it proved that we have not had a cracked fire-box on our road for four years. I would say, however, that I have always taken particular care to see that an engine is not washed while hot, and that the washing is thorough in every respect, including the crown sheet. The kind of coal and water used are no doubt important factors in the preservation of the metal. On our road we use Iowa coal, exclusively, and whilst it does not possess the carbon qualities of most eastern coal, yet I believe it is very much less destructive to fire-boxes than the latter, and I do not think I would exaggerate in saying that the use of some kinds of eastern coal, with good water, would be more injurious than some of the Iowa coal which we use would be with bad water, and that the life of metal would be affected from 60 to 70 per cent. from this cause alone.

Mr. T. N. Ely, General Superintendent of Motive Power, Pennsylvania Railroad, writes:

We have not used any iron for boilers or fire-boxes for a great many years. The introduction of steel upon the Pennsylvania Railroad came from the fact that after the close of the war, the *iron* made was very inferior, and a trial of steel so convinced us of its superiority over the best iron, that we have continued its use since that time and have no idea of changing.

We could not send you any figures showing the life of fire-boxes which would be reliable, without going over all our locomotives and selecting those which have worn-out fire-boxes.

As you possibly know, we do not always keep our locomotives until they are worn out, but sell or otherwise dispose of them as soon as they become too light or out of date for our service. In this way we lose the records of the fire-boxes to a great extent.

Specifications for Boiler and Fire-Box Steel.

All specifications for boiler and fire-box steel heretofore issued are hereby annulled and superseded by the following:

1. A careful examination will be made of every sheet, and none will be received that show mechanical defects.

2. A test strip from each sheet, taken lengthwise of the sheet, and without annealing, should have a tensile strength of 55,000 lbs. per square inch, and an elongation of 30 per cent. in section, originally 2 in. long.

3. Sheets will not be accepted if the test shows a tensile strength less than 50,000 lbs., or greater than 65,000 lbs. per square inch, nor if the elongation falls below 25 per cent.

4. Should any sheets develop defects in working, they will be rejected.

5. Manufacturers must send one test strip for each sheet (this strip must accompany the sheet in every case); both sheet and strip being properly stamped with the marks designated by this company, and also lettered with white lead to facilitate matching.

THEO. N. ELY,
General Sup't Motive Power.

OFFICE OF GENERAL SUPERINTENDENT MOTIVE POWER,
ALTOONA, Pa., January 6th, 1883.

Mr. N. W. Sample, Superintendent of Motive Power and Machinery, Denver & Rio Grande Railway, writes:

We have used steel exclusively for fire-boxes since 1877, and have no reason to doubt that it is superior to iron in every way; at least the experience here is that it is less liable to crack, less liable to mud burns and blisters, more readily flanged, tougher, stronger, and stands corrosion better than iron. I am satisfied it is the best material now in use for locomotive fire-boxes.

Mr. R. H. Briggs, Superintendent of Machinery, Chesapeake, Ohio & Southwestern Railroad, writes:

I have built quite a number of steel boilers in the last fifteen years, and have not experienced the least trouble whatever with them. I therefore cannot say relatively whether they are better than the best of iron boilers or not. I know, however, of iron boilers that have been in use for the last twenty-five years, and are doing good service yet, therefore I have had no means of comparing the durability of steel with iron, as my experience with steel only dates back fifteen years.

Mr. G. W. Tilton, Superintendent of Motive Power and Machinery, Chicago & Northwestern Railway, writes:

In regard to the relative value of iron and steel for locomotive boilers and fire-boxes, my practice has been for several years to use steel entirely for that purpose. I did at one time, some years ago, and since I have been using steel for that purpose, try some iron both for boilers and fire-boxes, but the results were not such as to warrant the substitution of iron for steel. While there may have been improvements made in the quality of iron produced for that purpose, and the use of steel is comparatively new as compared to iron, I think it is a question if the improvements in the steel product have not kept pace and even exceeded the improvements made in the iron product in that time. There is another factor in this question, and I think an important one, and that is the quality of coal and water supplied to locomotives in the different localities where the question is in controversy, as I think it is an important feature in deciding this matter intelligently.

Mr. Wm. Wilson, Superintendent of Machinery, Chicago & Alton Railroad, writes:

For boiler shells we are using steel almost exclusively. For fire-box purposes we use steel and copper, and in one or two instances we have put in iron side-sheets to test again the merits of this material for this purpose, but to date the service has been too short to base an opinion on. We use copper for fire-box purposes in engines having the Jauriet water-leg. In plain boxes with brick arch, we use steel, and have many boxes that came on the road in 1878 and 1879 that are still good. Of course, we have some trouble with steel plates, and also with iron plates, one of which was condemned yesterday, and expect more or less with any material we may use for this purpose.

My preference is for the material giving the best results; therefore copper for water-leg boxes and steel for plain boxes until we can fully demonstrate the superiority of some other metal.

Mr. W. C. Ennis, Master Mechanic, New York, Susquehanna & Western Railroad, writes:

Our experience with iron and steel fire-boxes, so far, is in favor of steel. Our locomotives are nearly all anthracite coal burners, with fire-boxes from, 9 to 11 feet in length. Iron will blister and give trouble. We have 10 locomotives that came here in 1873 with Bay State steel fire boxes. After two years of service, the side sheets commenced to crack, which generally happened when firing up after being washed out, and in two cases this happened while engine was in shop for repairs. Every side sheet in the 10 engines has cracked, although we adopted a rule to always fill with hot water when possible, which seemed to work well. Since 1878 I have used Otis steel exclusively for fire-boxes, both in new locomotives that have been built for us, and in repairs, so far, with the best results. I will not go back to iron until I am more fully convinced that it is a better material than steel.

Mr. Wm. Smith, Superintendent of Motive Power, Boston & Maine Railroad, writes:

We use nothing but steel for our boilers. I don't know as there is much difference between Otis and Nashua, both good steels, but we give Nashua the preference, owing to the fact of its being a home industry and so easy of access.

Mr. Geo. W. Cushing, Superintendent of Motive Power and Machinery, Northern Pacific Railroad, writes:

We are putting in a few iron fire-boxes as experiment in certain districts where steel plates seem to be injured by action of water.

In other districts steel plates are being used. We have engines 14 years old, and which have used coal for about 4 years of that time, with their original steel boxes. There are others less than 3 years in service which have cracked badly, some others which with 3 years service have developed small cracks from each and every stay in the box, and on the crown sheet; but these are extreme cases, and it is fair to say the general result in use of steel plates is good.

The pitting of steel in fire-boxes and in flues is common on certain sections of road, and possibly here iron may prove preferable; certainly so in flues.

The use of coal in iron fire-boxes in the early day was not a great success, yet there was got out of old fire-boxes that had run for many years in wood service, as much as two years' use in coal, and, I think, with Low Moor iron, new, there was four years' service. Copper ½ inch thick might run three to four years, but they get very thin indeed.

My experience in use of steel was exceptionally good, perhaps, for in about six years' service there were but two cracks or failures that I now remember up to 1870; but this was genuine good steel, English and American.

Whether the present steel is the best that can be made is, perhaps, a question for steel makers to answer, but there appear to be many more failures than formerly. Perhaps a part of this is due to a more severe service and greater pressure of steam.

Any facts that may develop I shall freely give you; but an opinion of the relative merits of steel and iron I would rather defer.

Mr. James Maglenn, Master Mechanic, Carolina Central Railroad, writes:

In no instance have we changed from steel to iron in our boiler or fire-box construction; but on the contrary are changing from iron to steel. We have had some trouble with iron fire-boxes blistering, and have replaced them with steel, and have no trouble with them for the last four or five years. There is no doubt in my mind that mild homogeneous steel is the material for boilers and fire-boxes.

Mr. P. J. Cochrane, Master of Machinery, South Carolina Railway, writes:

We use the homogenous steel exclusively, manufactured under the Lukens process, at Coatsville, Pa., and, so far as our experience goes, we have found nothing, either iron or steel, to surpass it. It works well under the hammer and flanges splendid, and shows no sign of galling at the shortest bends. Its tensile strength is far superior to iron, and has shown no blister when furnaces are constructed of it. Iron furnaces invariably crystallize after a few years service, and as we have not used the steel a sufficient length of time, I am unable to say what it will do under like conditions; but if our success continues the same as we have had so far, we have no desire to return to iron for any style of boiler.

Mr. Jas. D. Hollister, Superintendent, Florida Southern Railway, writes:

I have no data or records upon the subject that would be of value to you, but freely give you my opinion. I certainly cannot be classed among those you speak of as "going back to iron." I have always preferred iron, and have adhered to its use exclusively as to fire-boxes. I have used steel fire-boxes built by other parties, and have had some trouble from their cracking. I believe that with wood fuel, as is used exclusively in this section, iron fire-boxes will last better than steel, and have frequently known them to last 20 or 25 years, or until the locomotive was worn out and condemned.

I have had some shells made of steel; not because I preferred it, but more to meet the wishes of other parties. I consider iron more reliable for boiler shells, for the same reason that others claim to prefer steel, viz.: because it is more likely to prove of uniform quality. In each sheet there may be more homogeneity in the steel, but I think most users of steel plates have found a greater difference in plates, even from the same manufacturers, and that more careful tests are necessary to secure reliable sheets. I have been told of steel boiler plates from the best makers being broken by dropping them from a dray. In my opinion, one important factor of injury to boiler plates in service is *vibration*. Steel plates are more affected by this than iron ones are. I have had this proven to my satisfaction by using both materials in locomotive driving axles and piston rods. Of seven driving axles broken under locomotives in my charge during a certain period, six of them were steel and comparatively new, the iron one being at least eight years old. Out of a lot of 15 new locomotives fitted with steel piston rods, I had three rods break within one month. I have never had an iron piston rod break, except after very long service, and then through key-way and from over driving-key. These experiences have confirmed my preference for iron over steel.

Mr. J. N. Lauder, Superintendent Rolling Stock, Old Colony Railroad, writes:

With reference to your inquiry as to my experience and opinion of steel as a material for locomotive boilers, I have to say that I have used open-hearth steel for fire-boxes exclusively for the past ten years, having made a fire-box of Bay State steel as early as the year 1873. This fire-box is still in service, and free from defects of any kind. For the past eight years I have used steel for the whole boiler exclusively, part Otis and part Nashua, and in no instance thus far have I had a sheet crack or show any other defects in service. In my years of experience with Otis steel, I have never lost a plate either in manufacture or use, and with this practical experience of the use of steel for boilers, I can but indorse it as being, in my opinion, the best material known at the present time for this purpose. My feeling is that I could not afford to use iron, if it was given to me, with steel at present prices.

Mr. H. Wallis, Mechanical Superintendent, Grand Trunk Railway, writes:

There have been built on the Grand Trunk Railway at the works in Montreal during the past five years, 110 locomotives, of which the complete boilers of 20 have been made wholly of steel. Of the remaining 90, the barrels and fire-box casings of 86 are of iron, while 4 have barrels of iron and casings of fire-boxes of steel. Of the remaining fire-boxes, 84 are made entirely of steel and 6 have copper sides. My present practice is to use steel throughout of a mild and ductile quality, retaining the same thickness as usual in the past for iron. Looked at from the point of general efficiency and economy, this has seemed to give the best result.

Mr. G. H. Haselton, Superintendent of Motive Power and Machinery, Rome, Watertown & Ogdensburg Railroad, writes:

This company began using steel for fire-boxes some eight years ago, and we have used steel since then for the renewal of all fire-boxes, and the result was so satisfactory that four years ago we adopted steel exclusively in all our boiler construction. We prefer steel for the following reasons: First, the original fire-boxes put in eight years ago are now in good condition, whereas two iron ones placed in at the same time had to be renewed after four years of service. Second, in the construction of boilers there is, in my opinion, a large percentage in favor of steel, as better results are obtained if carefully manipulated than can be had from the use of iron. In the construction of our boilers all steel sheets that are worked in the fire are, after being flanged, carefully annealed. The only trouble we find with steel is that wherever a leak exists around mud-ring, corrosion takes place at that point, also the use of steel necessitates a more frequent washing out of boilers in order to prevent the accumulation of mud and scale and the cracking of sheets.

Mr. F. M. Wilder, Superintendent of Motive Power, New York, Lake Erie & Western Railroad, writes:

Our practice for the last 8 or 10 years has been invariably steel plate for fire-boxes, and for the last six years for the entire plate for boilers we use steel, which of course is of a very low grade, having very little carbon, and will not harden under ordinary circumstances. I find it more reliable for flanging and work of that kind generally than any iron which we have heretofore been able to get. It blisters less in use, and very few plates have ever cracked with us. We have now over 500 locomotives on our road which have steel fire-boxes, and probably 450 of them have steel shells.

Of course you will note that there is very little difference between a truly homogeneous iron and what is called low steel. It may be that a truly homogeneous iron is the one which you have reference to as coming into use to replace steel. The nature of the two materials is so nearly alike that it is only a question of name.

Mr. W. J. Robertson, Superintendent of Motive Power, Central Vermont Railroad, writes :

Steel plates are giving us good satisfaction for boilers and fire-boxes, and I prefer it to iron at present.

Mr. John S. Cook, Master Mechanic, Georgia Railroad, writes :

We have used steel fire-boxes in all our locomotives for the last 17 years, and for the past 7 years have had all our locomotive boilers made of steel throughout. No steel furnace or boiler has ever cost us one cent for repairs, and some of furnaces have run 500,000 miles. I intend to continue the use of steel exclusively.

Mr. J. B. Morgan, Master Mechanic, Toledo & Ohio Central Railway, writes :

All of our boilers and fire-boxes are Otis steel, and they have given entire satisfaction. We have not had any fire-box sheets crack as yet. Engines have been in service from four to six years. Our worst trouble is bad water. It leaves a heavy lime deposit so that flues have to be taken out about once every 12 months, and crown-sheet cleaned off every six months.

Mr. R. H. Soule, Superintendent of Motive Power, New York, West Shore & Buffalo Railway, writes :

I have taken occasion to confer with all three of our Master Mechanics in the matter of the relative merits of iron and steel for boiler and fire-box sheets. There is entire unanimity as regards the best material for fire-boxes. We prefer steel by all means. All our West Shore engines are built for 140 pounds pressure. If we used iron plates in the fire-boxes the material would have to be so thick that it would be liable to burn and blister in spots where the mud adhered to it on the water side. We get homogeneous steel; there seems to be less danger of cracking than there was even with iron plates.

As regards barrel sheets, we suppose iron could be made to do if cheapness of first cost was the only consideration. Personally, I would not feel at all easy in these days to build locomotive boilers from iron sheets when good homogeneous steel sheets of less thickness but of the same strength, can be obtained for the same or a little more money.

Mr. Joseph Wood, Superintendent of Motive Power of the Pittsburgh, Fort Wayne & Chicago road, says that they use steel entirely for boilers and fire-boxes, and have no thought of retrograding. The average life of 218 steel fire-boxes removed during the last six years was 7 years 10¼ months.

Mr Edward B. Wall, Superintendent of Motive Power, Pittsburgh, Cincinnati & St Louis Railway, says they have no idea of going back to iron for boilers and fire-boxes. They have some trouble with steel disintegrating below the grates, also with it cracking in short lines round the stay-bolts, but they have very little trouble with large cracks.

Mr. T. B. Twombly, General Master Mechanic, Chicago, Rock Island & Pacific Railway, writes :

I still continue to use steel in construction of boilers, both for fire-boxes and shells. The old trouble of cracks in fire-boxes has been almost entirely overcome, and I think we have no more trouble from that cause than we would have with iron fire-boxes. It is my belief that the external corrosion caused by leaks is greater on steel than on iron plates, and that from this cause the life of a steel boiler is a trifle shorter than that of an iron one ; but I consider this defect more than paid for by the possibility of getting steel sheets of any required size, thus reducing the number of seams and expense of construction. For this reason I still adhere to the use of steel.

Mr. F. A. Savage, Master Mechanic of the Kansas City, St. Joseph & Council Bluffs Railroad, writes :

With steel for locomotive boilers and fire-boxes, when I first began using it some nine years ago, we had some trouble at first in cracking, but for the past seven years, with Otis steel, we have not had any trouble whatever, and I like it much better than the iron in use for this purpose seven or eight years ago, which gave considerable bother on account of blistering. I have not used any iron since, and do not see how iron can be made to give any better results than the Otis steel we have had for the past seven years.

Steel Boiler Plates.

BY FRANK C. SMITH.

At the last Master Mechanics' convention it was recommended, if I remember correctly, that boiler steel of 65,000 pounds tensile strength and as high as .20 per cent. of carbon was about the right thing for locomotive use. No explanation of the size or shape of the test-piece on which the above tensile strength is based was given, nor was this developed in the discussion on the subject. It may not be, and probably is not known among railroad men generally, probably from the fact that so few roads make any tests of the boiler steel used, that the same piece of steel may be made to show vastly different results so far as tensile strength is concerned.

For instance, if a piece of fire-box steel of fair quality be tested as the U. S. Government requires, which is that the test-piece be made as in Fig. 1, and then placed in a testing machine and "pulled" until broken, the tensile

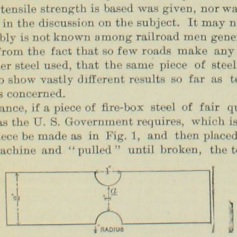


Fig. 1.

strength per square inch, based on the area at the point of fracture, which generally occurs at *a*, or where the test-piece measures 1 inch wide, will be (referring to actual results) 72,134 pounds per square inch. When the test-piece was made as in Fig. 2, the tensile strength per square inch was 66,200 pounds.

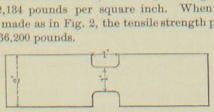


Fig. 2.

When the Pennsylvania Railroad shape was tried, as shown in Fig. 3, the tensile strength dropped to 60,900 pounds, while a plain parallel piece, as in Fig. 4, gave only 60,034 pounds.

These results are true of all boiler steel, and show that the shape of the test-piece has all to do with the results, and when the Master Mechanics' Association recommends or talks of the tensile strength of boiler steel, its remarks, to be fairly understood, should furnish some information as to the shape of the test-piece used to determine the tensile strength.

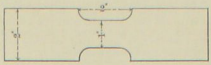


Fig. 3.

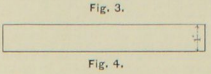


Fig. 4.

There are also other facts connected with the different shapes, which are, the percentage of elongation and the percentage of reduction of area. As all boiler steel is, or should be, very ductile, it elongates or stretches out in the testing machine before breaking. The Pennsylvania road in their shape, Fig. 3, require an elongation in two inches of 30 per cent , with a minimum allowance of 25 per cent. In the same test-piece referred to in Fig. 3, which had a tensile strength of 60,900 pounds, the elongation was 28 per cent., while the parallel test-piece, Fig. 4, gave an elongation of 37 per cent. in two inches. The "contraction or reduction of area," which means the area at point of fracture of the test-piece after breaking, as compared with the area before breaking, was in Fig. 3, 51 per cent., while in the parallel piece, Fig. 4, it was 57 per cent. So far, therefore, as the different shapes are concerned, the parallel piece, Fig. 4, shows the lowest tensile strength, but a greater elongation and contraction of area than any other shape.

Roads making requirements on boiler steel base their requirements on the tensile strength and percentage of elongation of some queer shape of test-piece, while the government ignores the elongation, and requires a given tensile strength and contraction of area, as follows :

Tensile strength. Pounds.	Reduction of area. Per cent
65,000 must give	60
60,000 "	55
55,000 "	50
50,000 "	45

with a margin of 7 per cent., so that the requirement for 65,000 tensile strength would be filled by 53 per cent. of reduction of area. In making these requirements, the government has directly reversed the reduction of area requirements, as there should be the greatest contraction of area for the lowest tensile strength. This follows from the fact that the poorest and cheapest quality of boiler steel shows highest tensile strength with the least reduction of area, while it is not possible to make boiler steel fit for locomotive boilers with high tensile strength and a sufficient reduction of area to indicate the necessary ductility required for locomotive fire-boxes. Too many persons believe that a high tensile strength in boiler steel is the right thing, and the higher the better. The fallacy of this is shown by the fact that Bessemer steel, which can be bought for 2 cents or less per pound, will show a tensile strength of from 90,000 to 140,000 pounds, with a very small per cent, of elongation or contraction of area, and no master mechanic would think of making fire-boxes of Bessemer steel. The facts really are, that it requires the best of material, process and labor to produce a steel with a low tensile strength, but with large per cent. of elongation and contraction, such as is required in a fire-box steel, while the reverse is true for a steel showing very high tensile strength. The proportion of carbon (.20) referred to by the association, is too high if the best metal for fire-boxes is desired, from the fact that carbon is responsible largely for the tensile strength and tempering qualities of steel, inasmuch as boiler steel with from .10 to .15 per cent. of carbon will not be affected by heating red hot and cooling in water, but will be, on the contrary, improved or made more ductile, while steel with .18 per cent. and upward of carbon, has sufficient of the same to show symptoms of hardening by such treatment, and it is plain, therefore, that such a proportion of carbon would have a bad effect in steel used for fire-boxes. From this it readily can be seen why high tensile strength is incompatible with the best fire-box steel; that is to say, the tensile strength is largely dependent on the proportion of carbon, and if the proportion exceeds .15 greatly, its influence is sufficient to harden the steel when it is heated and cooled in water, or subjected to any great variation of temperature. The best fire-box steel made does not have a greater proportion of carbon than .14, and a tensile strength of about 68,000 pounds in the government shape of test-piece. In Bessemer steel, in a piece showing 140,000 pounds tensile strength, the proportion of carbon was .47 per cent.

The following table will show how largely carbon affects the strength of steel from actual tests on boiler plate :

Carbon. Per cent.	Tensile strength. Pounds.	Carbon. Per cent.	Tensile strength. Pounds.
.10	56,800	.15	69,800
.11	60,600	.16	70,800
.12	63,800	.17	71,600
.13	66,400	.18	72,300
.14	68,400		

It is a fact that the government requirements are not only too stringent; but, as already shown, they have reversed the natural conditions following an increase of tensile strength, and it would be extremely hard, if not impossible, to obtain a guarantee from any steel maker in the world, for 70,000 pounds tensile strength, with 60 per cent. reduction of area at the fractured section, simply because great tensile strength and great ductility are not to be found together.

Many intelligent users of boiler steel cast aside as useless and unsatisfactory the ordinary mechanical tests, such as bending over cold, testing for tensile strength, etc., and depend altogether, and wisely too, on the chemical analysis of the steel, because steel which will pass such tests is frequently much shorter-lived than other steel giving the same tests, but showing a different analysis. For instance, steel showing the following analysis :

Carbon.	Phosphorus.	Manganese.	Silica.
.13	.017	.3	.019

will not only pass all of the mechanical tests, but will last in a fire-box 100 per cent. longer than steel showing this analysis :

Carbon.	Phosphorus.	Manganese.	Silica.
.13	.096	.311	.019

which will also pass the mechanical tests. This follows from the fact that the former is a much purer metal than the latter, principally because the percentage of phosphorus is less. Phosphorus is the great bane of steel makers, and is undoubtedly more influential on the quality of steel than any other ingredient. This is shown by the fact that tool steel makers require scrap steel with as little phosphorus as possible, which they buy largely from steel boiler-plate makers—the scrap sheared from the plates in squaring and cutting them to size—and the value of the scrap is determined by analysis. For instance, scrap from the first analysis would bring from $40 to $50 per ton, while scrap from the second could be bought for from $20 to $25, the difference being based solely on the smaller percentage—small as it is—of phosphorus in the first than the second analysis. The bulk of boiler steel now in use in locomotives will not show as good an analysis as the second, and will not therefore last anything near as long as plate showing the first analysis.

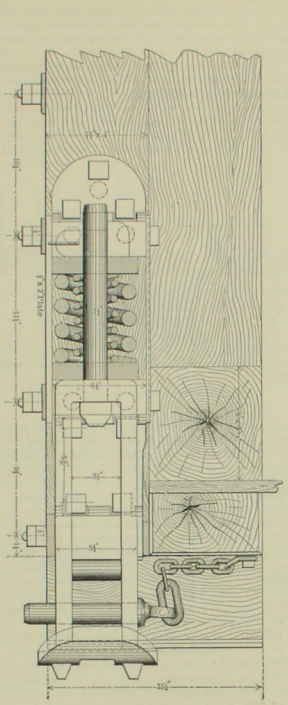
The Most Economical Locomotive in the World.

In reply to inquiries about the quantity of fuel burned per train mile by the Wootten locomotive, which he has running with a 6½-inch nozzle, Mr. John J. Bingley, Master Mechanic of the Hanover & Gettysburg Railroad, writes us many interesting particulars about the work done by the engine. The engine runs a local accommodation freight train daily, doubling 51.2 miles of track that rises 515 feet between the starting and terminal stations, and is rolling all the way. The regular day's work of the engine is, to be taken out at 3 A. M., to get the train ready for starting at 4:20 A. M. All the way station switching work has to be done, and the engine does not get back till 7:28 P. M. By the time the engine gets the train put away she has been working 17 hours. The trains hauled are a fair average for any freight train. During the week ending September 6, when a close record of the fuel used was kept, the engine moved 229 loaded, and 135 empty cars, besides a passenger coach. The engine is credited with 4 hours switching per day, which seems to be within the limit of work done. To do all this work, the engine burns 3,600 pounds of the finest dust Cumberland coal. Reckoning six miles per hour for switching, the engine makes 128 miles per day, the fuel consumed being 28 pounds per train mile. It is doubtful if there is a locomotive on any other railroad pulling a freight train of equal weight, and doing the work with such a small consumption of coal; and we are certainly safe in saying that no locomotive running ordinary trains costs so little for fuel.

A New Refrigerator Car.

We recently examined at Chicago an entirely new style of refrigerator car, the invention of Mr. C. C. Palmer, of Painesville, O. The part of the car intended for carrying the perishable cargo is built similar to other refrigerator cars where careful insulation from atmospheric influences is secured. The leading difference in this system from all others, is the means used for keeping down the temperature. Part of the car at one end is divided off from the refrigerator portion, and a freezing machine is placed in it similar in many respects to ammonia ice-making machines. A highly volatile liquid, which acts like ether, but is said to be a much safer freezing medium, is used, and is compressed by two double-acting pumps which receive motion from the car axle by means of two cone pulleys. Pipes arranged like those of a heat radiator are placed inside the car for the vapor from the liquid to expand in. The expansion of the vapor produces cold, which chills the pipes and abstracts the heat from the refrigerating apartment. The whole machinery weighs only 1,800 pounds, and the inventor and proprietor says it can be reduced to 1,200 pounds. The car has carried two cargoes of meat from Chicago to New York, one cargo from Kansas City to New York, and one cargo from Chicago to Boston, all being done satisfactorily. The car is now bringing a cargo of fruit from San Francisco to Chicago.

FREIGHT CAR DRAW-GEAR OF LEHIGH VALLEY RAILROAD.



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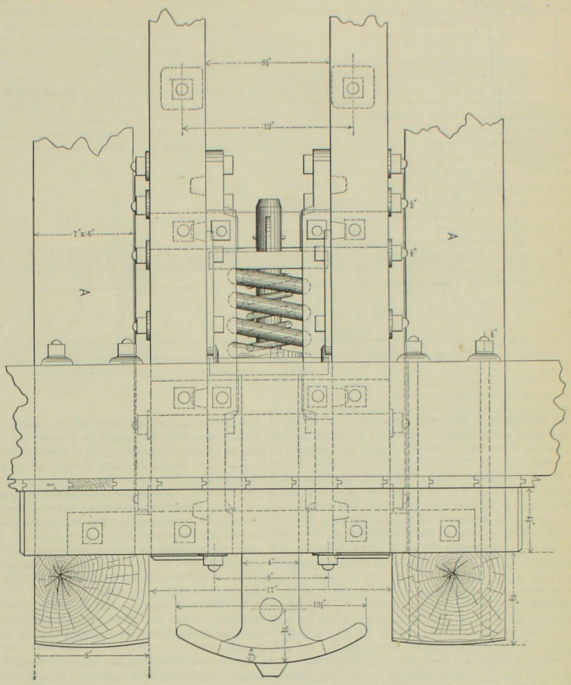
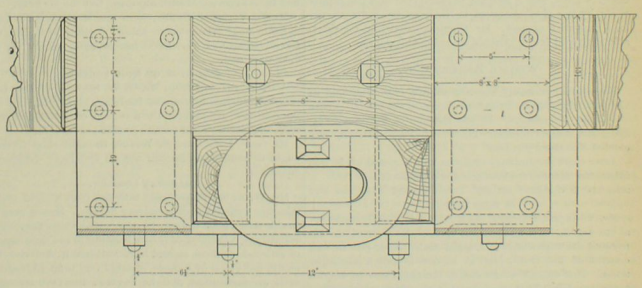


Plan.



Front View.

THE cuts show the details of the draw-gear used on the Lehigh Valley road, together with the method of applying it to the cars. The whole arrangement is very compact, and the timber is so disposed that the iron work is of the simplest kind. The draw-head is short, in its normal position not extending further back than the inside of the end sill. The projection beyond the dead-woods is about 1½ inches, the intention being to take the blow of the buffing on the frame of the car before the spring is exhausted. This plan makes the work for the bolts and castings very light, as it throws all the more violent shocks upon the frame of the car nearly in a line with the center sills. The sticks shown at *A A* in the plan, run from the bottom of the blocks back to the bolster where they have a firm bearing in a pocket casting. The weight of the draw-gear thus fitted up is small, and the car is relieved of much of the load which is usually placed upon the end for the same purpose. The practice of the road shows that this is a very material advantage. The dead-blocks are so long that there is no possibility of the lowest car running under hem. They are as near together as they can be and give sufficient clearance to the draw-head. The brakeman has only 16½ inches to reach in order to get at the pin. If the cars come together, shutting up the springs and striking the dead-woods, there is a space of 11 inches on each car, or 22 inches in all between Lehigh Valley cars, which is sufficient to protect a large man. As the dead-woods measure but 33 inches from out to out, there is no danger that even a narrow dead-block will pass between them. In case a car should bring its end sill flat against the dead-woods there would be a sufficient space to prevent a man of ordinary size from injury if he stood sidewise. As the advantages of this form of construction are becoming known it is regarded with more and more favor, and many old railway men who were formerly opposed to it now consider it the correct method.

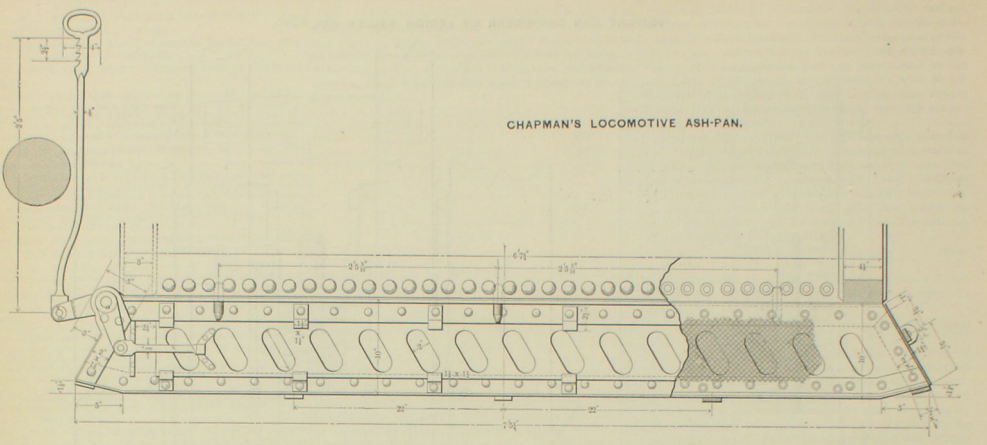
Building Locomotives in Contract Shops.

Mr. H. G. Brooks, President of the Brooks Locomotive Works, Dunkirk, N. Y., having been requested by the editors of the Railway Age to give his views on the relative economy of railroad companies purchasing or building their own locomotives, writes his opinion with considerable minuteness. The views of Mr. J. H. Setchel, Superintendent of the works, are also given. As Mr. Setchel was till very recently the master mechanic of a road that followed the practice to some extent of building their own locomotives, his knowledge of the subject may be safely accepted as thoroughly applicable to present practice. Mr. Setchel holds that working continually on the same operations, enables a mechanic to do much more work than when he is frequently changing his operations, hence the skill begotten of constant practice gives contract shops an advantage over repair shops. He also says that when new work is done in a repair shop, such work is often made to appear economically constructed by a portion of the labor being charged to engines in service. Mr. Brooks holds that contract shops supply locomotives cheaper than they can be built in railroad shops, except when a great demand exists for engines to be built on short time. Exorbitant prices are charged for locomotives at such times, but the railroad companies that suffer then, have themselves to blame for not keeping up their equipment. The railroads that have habitually to pay high prices for locomotives they buy, are those that let their equipment run down during periods of depression, and have to renew extensively when a revival of business comes round. Mr. Brooks might have truthfully added that the policy pursued by such roads has a direct tendency to render the business of the country fluctuating, and is demoralizing to numerous industries, so they do not deserve any sympathy for having to pay a high price for rolling stock or other equipment.

Letter-Ballot Results.

The Secretary of the Master Car-Builders' Association has issued a circular announcing the rejection, by letter-ballot, of the Standard Wheel Tread and Flange recommended by the committee on that subject at the convention at Old Point Comfort last June, there being 233 affirmative and 146 negative votes cast, the affirmative lacking 20 of the requisite two-thirds. The circular also announces that the standard and limit variation of ¼-inch each way from 4 ft. 5½ in. between inside of wheel flanges, recommended by the same committee, was adopted by a vote of 368 to 14.

The result of the letter-ballot on the adoption of a Standard Brake-Shoe and Head, has also been announced. The "Christie" shoe and head received 269 affirmative, against 163 negative votes. The "Collin" shoe and head received 130 affirmative against 245 negative votes. As neither of them received the requisite two-thirds of all the votes cast, neither of them is adopted as a standard.



CHAPMAN'S LOCOMOTIVE ASH-PAN.

IT is well known to those who have closely investigated the operation of the draft appliances of locomotives, that the ordinary American locomotive loses a vast amount of heat while running, owing to the intense hurricane of wind that rushes through the front damper and tears up any thin portions of the fire. Want of proper means of regulating the admission of air to the fire is another source of loss of heat. To remedy these evils, Mr. J. L. Chapman, Superintendent of Motive Power of the Chesapeake & Ohio Railway, designed the ash-pan shown in the engravings. Its construction will be readily understood after an examination of the cuts. On the sides of the ash-pan, fifteen oblong holes, 2 × 4½ inches, are cut. Over them a sliding-plate is fitted, also provided with holes to fit those on the ash-pan. Sufficient space is left between the holes to make a covering when the sliding-plate is moved with its holes clear of those on the ash-pan. Notches are made on the lever operating the slides, so that they can be moved various distances to meet the requirements of a full or reduced admission of air. By using this arrangement, the engines can be run with the front and back dampers closed, and the admission of air to all parts of the fire is perfectly uniform. When an engine is working very hard, and is burning so much coal that the supply of air by the side openings is likely to be deficient, the back damper is opened. Mr. Chapman says that considerable saving of fuel is effected by using this damper.

Western Railway Club.

The regular monthly meeting of this club was held at Chicago, October 21, President Pierce in the chair. There was a fair attendance. In the absence of Secretary Forsyth, Mr. Angus Sinclair, NATIONAL CAR-BUILDER, was elected Secretary pro tem.

After some preliminary business was disposed of, it was intimated that the first subject for discussion was :

SHOULD AUTOMATIC BRAKES FOR FREIGHT CARS BE PUT ON BOTH TRUCKS?

Mr. Verbryck, Chicago, Rock Island & Pacific Railway, at the request of the president, opened the discussion. He favored the engineer of a freight train being put in full control of the train, just as he now is with a passenger train. This change would enable freight trains to be run faster, and would give railroad companies more use of their rolling stock. They have air-brakes on part of their freight equipment, and they give satisfaction.

Mr. Mackenzie, New York, Chicago & St. Louis Railway, asked what effect the brakes had on the wheels, and if the brakes were put on both trucks?

Mr. Verbryck answered that they had not had enough experience with the automatic brake on freight cars to judge of its effect on the wheels. They put the brake on both trucks of a car where the automatic brake was put on, and he was following the same practice with all freight cars.

Mr. Townsend, Chicago & Alton, had no automatic brakes on any of their freight cars. He favored that kind of brake, thought it saved life and property, and gave a railroad company more service out of its equipment. He believed in putting the brakes on both trucks, for with that plan there was not much danger of sliding the wheels.

Mr. Sinclair said he had been at Aurora on the previous day, and thought the members would be interested in something he heard the Chicago, Burlington & Quincy Railroad people were doing. They had been using the automatic air-brake on some of their cars for over a year, and no more repairs had been done to them than was necessary to keep them working. The cars had now been called in to Aurora and put on a train without repairs being made on the brakes, and tests were to be made of how the brake would do the work of stopping the train. This, it was believed, would be a good test of a brake's capacity for standing the ordeal of rough service.

Mr. W. A. Smith, *Railway Review*, drew attention to the circular lately issued by a committee of the Master Car-Builders, inviting the patentees and proprietors of automatic freight-car brakes to a test of their brakes. He thought the requirements were too exacting, and wished to hear the opinion of the members about it. Each company was required to furnish 50 box cars, which was not reasonable, and he saw no reason why the railroad companies should not be asked to supply the cars when the inventors furnished the brakes.

Mr. Verbryck regarded that as a rather delicate subject for him to speak on. He supported the terms made by the committee, but finally admitted that 50 cars were too many.

Mr. Snow, Illinois Central Railroad, thought the experience of railroads with brakes for passenger trains ought to guide them in selecting a brake for freight cars. Automatic freight-car brakes would be expensive for repairs, especially when the cars were away from home, but he believed it would pay railroad companies to use them. He had little experience with anything but the air brake.

Messrs. Verbryck, Smith, Snow and Mackenzie discussed at some length the relative value of different brakes, and the advantage of automatic brakes, after which the discussion closed.

SELECTION OF SHOP FOREMEN.

A letter was read from Mr. G. W. Stevens, of the Lake Shore & Michigan Southern Railway, giving his views on the subject. He favored the selection of intelligent men with executive ability for the position of foreman.

Mr. Gore, Lafayette Car Works, thought shop foremen ought to understand human nature and have decision of character.

RAILWAY LIBRARY.

Mr. W. A. Smith proposed that the club should undertake the formation of a railway library. It was very desirable that a good railway library, containing a thoroughly exhaustive collection of books relating to all departments of railroad business, should be established in America, and he did not know of a more suitable city than Chicago for such an institution, and he favored this club arranging to carry out the business.

All the members present were asked to express their views on the subject, and all favored proceeding with the project.

A committee was then appointed to do the preliminary work.

Roadmaster's Convention.

The largest meeting of the Roadmaster's Association assembled at the Tremont House, Chicago, Oct. 14. President Burnett occupied the chair. After the preliminary work was finished, which included listening to an address of welcome by Mayor Harrison, the president intimated that the first subject for consideration was Railway Switches. The report not being ready, Railroad Frogs and Guard-Rails was taken up. The committee reported in favor of the spring rail frog as superior to the stiff rail. Frog riveted to a plate was preferred to one held by clamp and bolts, but there was some diversity of opinion. A length of 15 feet was recommended for frogs. To suit the wheel limit of 4 feet 5½ inches, adopted by the Master Car-Builders' Association, and that of 4 feet 5 inches, adopted by the Pennsylvania Railroad, the association recommended that the guard-rail distance should be 2 inches, and the throat of frog the same. They recommended that the gauge should be exact at the point.

In the discussion that followed the reading of this report, considerable opposition was raised to the spring rail frog. The riveted frog was decidedly the favorite compared with those fastened by bolts. On the other subjects little opposition was raised to the views of the committee.

A report was made on "Handling Coal for Locomotives," which made out that considerable saving was effected by using chutes. The subject was referred to the Association of Railway Superintendents.

The committee on "Weight and Form of Rail" recommended 60 pounds per yard for light and 70 pounds per yard for heavy traffic. For form they recommended that the base be equal to the height, and that the radius of the top of the head be the same as that of the fillet of the wheel, ½ inch preferred.

Considerable discussion followed the reading of this report, but no change was recommended.

"Railway Switches" was next taken up, and a lengthy discussion ensued on the relative merits of stub and split switches. Both kinds had their advocates, but the split switchmen got the best arguments in.

The committee on "Gravel and Cinder Ballast" reported in favor of gravel for the road and cinders for yards. What was the cheapest method of handling gravel, steam shovel and plow or by hand, was said to depend very much on circumstances.

The committee on "Rock Ballast" reported strongly in favor of rock as compared to gravel or sand. During the discussion that followed the reading of the report, however, the expressed opinion was decidedly against rock. A member who had used rock for 30 years used to think there was nothing like it, but now his opinions had undergone a change. He had some 40 miles ballasted with gravel and it is the finest piece of track he has. One man can do as much work in gravel as two in rock. His company is now trying to get a gravel pit, in order to raise the road 6 inches. The rock men claimed that in some places it was economical to use stone, especially on sharp curves. The gravel men claimed that their drainage was just as perfect as with stone.

The last subject introduced for discussion was the "Elevation of Curves." The prevailing practice appeared to be raising the outer rail ¼ inch for a degree, but some of the speakers insisted that ⅛ of an inch for a degree was necessary for high speed.

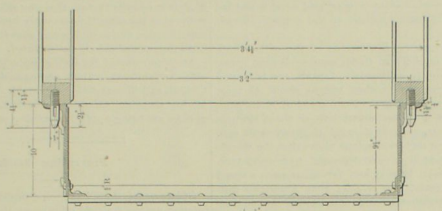
The next meeting of the association will be held in St. Louis.

The Hackensack Collisions.

The most disastrous accident which has marred American railroad operating for several years, happened on the Hackensack Meadows of the Pennsylvania Railroad, on the evening of October 18. At 7:50 P.M. that evening, a west-bound emigrant train left Jersey City, the train consisting of an engine, seven box-cars loaded with baggage, caboose, and seven passenger cars, the latter all heavily loaded with passengers. This train stopped at the coaling station on the Meadows for the locomotive to take coal. On starting, the coupling of the last car broke, causing some delay, but no danger was apprehended, for the road at that part is operated under an absolute block system, which prohibits two trains from being on the same block. But owing to a fatal mistake of the signal-man controlling the block on which the emigrant train stood, a fast express train was permitted to enter it without any warning of danger, and this train, owing to a slight fog covering the low-lying meadows, was almost close to the delayed train before its proximity was observed, and a violent collision ensued. This collision was not probably very fatal in itself, but the shock threw the caboose and the last passen

ger car of the emigrant train over upon the east-bound track, and before a signal could be sent out to protect the wreck, a Lehigh Valley train coming from the West, then due, dashed into the obstruction. Between the two collisions nine persons lost their lives and several others were severely injured.

This dual collision happened on a road where all the most approved appliances that human labor, ingenuity and skill have produced to make railroad operating safe, have been adopted. The accident shows that perfection of system and the best of appliances may be rendered futile by the human tendency to err. It is doubtful if ever a system of train protection will be devised that does



not depend on human care as the key, and while man continues fallible that key may be missing at the supreme moment. We believe this accident to have been a kind of fatality which shall never be totally eliminated from railroad operating. While we deplore the loss of life, we must confess that had it not been for the presence of excellent power appliances controlling the speed of the express train, the death list might have been more appalling. The Pacific express, which ran into the emigrant train, was a very heavy train run by a very powerful locomotive. There were four sleepers, three coaches, one combination car, and one baggage car, pulled by engine No. 10, one of the class K, high-speed locomotives. The train would weigh about 255 tons, and the engine and tender about 60 tons more, making 315 tons. This train is allowed 17 minutes to run to Newark, a distance of 9.3 miles. Three minutes of this time is usually consumed in the first mile, getting clear of the switches and crossings, and a speed of 35 miles an hour is seldom attained till Marion is passed, which is on top of a hill three miles out, and the engineers depend on a fast spin through the Meadows to make up the running time. Owing to these circumstances, when the signalman at Marion gave this train the clear signal, the engineer kept running to make time, and when the tail lamp of the delayed emigrant train suddenly flashed upon his vision there was no question but he was running 50 miles an hour. Then he was probably within 300 feet of the obstruction. That the engineer made noble use of the stopping power at his command, is evident from the fact that his engine did not plow half way through the emigrant train. With such an engine and such a train behind it, there would have been little but splinters of wood and humanity left in the last four cars of the emigrant train had the express locomotive struck it at a speed over 20 miles an hour. The horrors of the accident are deplorable, but they are light compound to what they would have been, but for the action of a most efficient brake properly handled.

Rules of Interchange.

A circular from the Secretary of the Car-Builders' Association, dated Oct. 15, announces that at a meeting of the Executive Committee, held at Buffalo Sept. 14, the following interpretation was given to Rule 9, which relates to charges for replacing wheels and axles:

"Boring and fitting wheels, each 50 cents, is a proper charge for every wheel used in the repairs contemplated by this rule.

"Drawing and replacing, per axle 50 cents, is a proper charge for every axle drawn from a truck for the repairs contemplated by this rule, whether the same axle or another is put back.

"Turning axles, each 40 cents, is a proper charge only when a new axle is used."

A change is also recommended in the form of bill as given in Rule 10 by adding a heading of "Labor Performed," divided into three columns, headed "Boring and Fitting," "Drawing and Replacing" and "Turning Axle" respectively.

Wootten Locomotives at the West.

Several Western railroads that have slack coal and other cheap fuels that they would like to use in locomotives, have recently turned their attention to the Wootten locomotive in the expectation that the well-known dirt burning fire-box might serve their purpose and promote economy in operating. To find out exactly what an engine of this kind would do with inferior coal, the Union Pacific Railway Company borrowed engine No. 883, belonging to the Philadelphia & Reading Railroad, and it ran on different divisions of the road for several weeks and gave so much satisfaction that the Union Pacific Company are having the fire-boxes of several of their engines altered to the Wootten pattern. The Philadelphia & Reading locomotive that ran on the Union Pacific is a consolidation engine, with cylinders 20 × 24 inches, drivers 52 inches diameter and boiler 60 inches diameter. In working order the engine weighs 55 tons.

The Atchison, Topeka & Santa Fe Railroad people are also anxious to burn cheap coal and save money in operating, so they have hired the Philadelphia & Reading engine to see what it can do on their steep grades with the slack coal that can be got almost for the hauling. She is now running on the mountain divisions of that road and is giving great satisfaction. When this engine went through Denver on her way to Santa Fe, she excited great attention among all classes of people, and crowds went to see her. In this connection, the Denver *Tribune-Republican* displayed ingenious enterprise by making a cut of the engine with line types. They also gave a detailed description covering a column, which was got out in a style worthy of a first-class mechanical paper. A correct description of a machine in the pages of a daily paper is something rare, and the above-named paper deserves full credit for having a reporter who knows the difference between an exhaust nozzle and an injector.

English Sleeping Car Comforts.

British railway companies are slowly introducing sleeping cars upon their lines, but the heavy American style of sleeper does not appear to be popular, and small sleeping carriages, similar in size to the day coaches in use on European railways, are being placed on some roads. A sleeping carriage fashioned after the English style, was recently designed for a South American railroad, and *Engineering* published engravings and a description giving full particulars of the carriage. It is about the size of our largest stock cars, and, as far as we can judge, will be very badly adapted for a South American railroad. But if no other kind of sleeping cars are placed on the road, that type will be better than traveling in day coaches. Among the improvements introduced in the construction of this car is "a pad to form a rest for the knee, in order to obviate the necessity for passengers taking a portmanteau into bed with them in order to get a due amount of support for sleeping on the side." This improvement has bewildered the editor of a leading railroad journal, who can not conceive why British travelers should need the aid of a valise to steady them in bed. The following pen picture of railway traveling in Australia in cars of similar construction, will help to clear up the mystery:

"Australian railways are patterned after those of England, so that the 'overland journey' from Sydney to Melbourne is somewhat of an ordeal to an American. We went on the 'limited express,' which covers the 570 miles in 18 hours. We found the train to consist of an English locomotive, a 'luggage, and mail van,' one compartment 'carriage,' and two sleeping cars. The latter bore a far-away resemblance to an American sleeper. They were mounted on trucks like ours, and were entered from the end, but were lower and narrower to conform to the other carriages. Large panels in the sides swing out like doors between the sections, and the upper berths were hung on to them something like rigid hammers. One section had to be devoted to mattresses and blankets—even during the day—for lack of room, and all the arrangements are so clumsy that it took the conductor an hour to make up four sections for the night, the whole car being strewn with odds and ends of lumber and bedding meanwhile, and the passengers trying to keep out of the way as best they could. A number of sections were divided from the rest of the car by a portable door or *portière*, and assigned to the ladies. They entered one end of the car and the gentlemen the other. As there is no occasion for any one to walk through the train, as with us, the lady passengers are quite secluded, and can make their preparations for the night without embarrassment.

"The train ran furiously all night. I lay in my narrow shelf in a cold perspiration, and grabbed frantically at the edges of the bunk to keep from being thrown out as the car struck the sharp curves on the down-grades. It seemed every instant as if we should be swung over by the centrifugal force, like the end boy in the game of 'crack the whip.' It was wretchedly cold, too, in spite of all the blankets in which we were rolled.

"I was just getting to sleep when we were all awakened and ordered up at 4.30. We breakfasted at 5 in the cold, frosty morning air in a room without heat, a most careless proceeding. Then we rode three miles farther and had to turn out again. However, as it was just as warm outside the car as in it, we rather enjoyed the exercise. We were at the frontier, and as Victoria goes in for protection, while New South Wales believes in free trade, we had to have our luggage examined. Then, as the New South Wales engineers favor one gauge for their railroads and the Victorian another, it is impossible to run a train through intact from Sydney to Melbourne. The two colonies are intensely jealous of each other in every way, and so they make many things as inconvenient for themselves as they can. We therefore had to transfer ourselves and our 'goods and chattels' to another train of ordinary continental compartment carriages.

"On the return journey all this performance has to be gone through with at midnight. Imagine such a state of affairs to exist between two such cities as Chicago and Buffalo, or Chicago and Omaha! We sat wrapped in shawls and blankets, in our hack style of conveyance, trying to keep partially comfortable. The colonials alight at every station and 'brace' to keep warm; so, as the government derives revenue from the importation of liquors, it may be good policy not to heat the cars!"

Communications.

The Coal Premium System on the Pennsylvania Railroad.

To the Editor of the National Car-Builder:

The important feature of the Coal Premium System as used by the Pennsylvania Railroad, and the one which should commend itself most favorably to the minds of railroad managers, is the opening of an account with each engineman and fireman, in which an accurate record of the amount of fuel consumed and work performed is kept with the *individual* instead of the engine, although the latter can also very easily be done by means of this same system. This arrangement enables the head of the motive power department to compare the records made by the men with each other, and to see at a glance which of them are doing their work most economically.

At first sight it would appear as though the task of charging each engineman and fireman with the amounts of coal consumed, and crediting with the car mileage made, would be rather a large and laborious undertaking, and while this is partially the case, yet, after all, it is very simple and easily done, that is, after all the arrangements have been perfected and put into smooth running order.

In starting this system, the first thing to be done is to establish limits of coal permitted to be consumed per car mile. This can best be done by experienced men riding on each run, and finding out for themselves the amount of coal used during the trip. After making a couple of trips, it is an easy matter to find from the figures obtained a limit which will do very well to start with, and which can be diminished as the good effects of the system make themselves felt in decreased averages of coal consumed per car mile.

After limits for all the runs have been fixed in this way, it is then time to begin to familiarize the runners and firemen with the details of the system, as they are to be brought into contact with it. This is best done by means of a circular letter, giving a full description of the system, and sending it to each man. Let that be followed by a man who is well versed in the thing, riding with them and explaining that which they do not clearly understand. In making a trip that is governed by this system, the first thing to be done is to have all the coal on the tender shoveled down on a level with the top of the coal space; then it is to be measured, and the length of the pile in feet is placed upon the stub, a check on the "starting" line. This represents the amount of coal with which the engine commences her run. If the engineman draws any coal while out on the road, he places the amount on the stub opposite the name of the coaling station at which it was drawn. When the engine reaches the end of the run, the coal is again measured, and the latter measurement is placed on the "arriving" line on the stub. After the engineman places on it his and the fireman's name, date, schedule number of the train and direction it was hauled, and the starting and arriving points, for all of which there are proper places provided on the stub, it is sent to the premium clerk, who places on it the number of car miles made during the trip and the amount of coal consumed. The engineman is also instructed to place on the back of the stub the number of hours during which the engine had its fire banked, for which he is credited with 38 pounds of coal per hour. The operation of finding out how much coal was consumed is very simple.

The weight of one linear foot of coal in the coal space of a Pennsylvania Railroad tender is 644 pounds. Suppose that the tender had 10 feet of coal when starting; that amount in feet represents 6,440 pounds. The engineman draws 6,000 pounds on the trip; that added to the other makes 12,440 pounds as the entire amount of coal on the tender during the run. The engine brings in 8 feet of coal on the tender, which makes 5,152 pounds to be substracted from the 12,440 pounds, leaving 7,288 pounds as the actual amount of fuel consumed.

If the engine had any banked fire, say 10 hours, then we subtract 380 pounds from the 7,288 pounds, leaving 6,908 pounds as the amount of fuel consumed while the engine was doing its work. The clerk then takes the car mileage sheet, which is furnished him by the car record office, and finds out and places on the stub the number of car miles that the engine has made, which on this imaginary trip we will say was 1,512 miles. At a limit of 5 pounds per car mile, this would give the runner 7,560 pounds as the amount of fuel which he could have consumed without making an excess.

At these figures, however, he saves 652 pounds, which, at a premium of 1¼ cents per hundred weight, gives him and his firemen each a premium of 8 cents, and a corresponding saving to the company. It takes very much longer to describe this operation than to actually perform it. On paper it looks rather complicated, but this is not the case. The writer has been in close contact with every detail of this system, from arranging the limits to making up the stubs, and he has found that with a little care the whole thing moves off like clock-work. It is a good plan, and one usually followed by premium clerks, at the middle of the month to put the coal and mileage up to date; this avoids a rush when the entire month's record of the men is to be adjusted.

After the records of the men are made up on the office

sheets, these are copied on blanks to be sent to the Superintendent of Motive Power; the entire amount of coal that each man has consumed during the month, the number of pounds saved or used in excess, and the amount of his premium. These blanks are accompanied by a sheet which shows at a glance the total number of men in different services working for a premium, the number of men earning one, the lowest and highest premiums made, the average premium, total premiums, entire amount of fuel consumed by enginemen, total car mileage and average amount of coal used per car per mile. On a sheet posted in the roundhouse and open to the inspection of all, there are placed the names of the men, amount of coal consumed, amount saved or used in excess and premiums earned.

The man earning the largest premium receives a complimentary letter.

The men using an excess, of which there are usually very few, are sent a letter of censure, and if in the next month or two there is no improvement in their record, there are steps taken to find out just who or what is at fault. There never is any difficulty in ascertaining whether the blame is to be attached to the engineman, fireman or engine.

It is thought by a great many persons that the introduction of this system on a line of road will be attended by considerable expense in the shape of a great deal of extra clerk hire, extra men to do the shoveling, measuring of the coal, etc. Some know so little about it that they imagine that it will require the services of a clerk for each half dozen engines on the road. Now, this is not the case. One clerk in connection with a man experienced in all the details of the system, keeping an eye both upon the road and office, can work up from 80 to 100 engines. No extra men need to be employed at the roundhouse. The firemen shovel down the coal, and one of the hostlers or wipers can be detailed to measure the coal as the engines come in, besides having plenty of time to attend to his other work. The expense as compared with the saving is but slight.

I expect that those who are interested enough in this matter to read this article, will want to know what has been accomplished by it. As far as saving coal is concerned, I *know* that in ten months after its introduction on the road with which I am connected, it reduced the average coal used per car mile 1.34 pounds, which was equal to an annual saving of about $350 per engine. This was done in spite of the fact that previous to the introduction of the present system there had been another fuel saving system of a different sort in operation on the same road, and that a great many of the runners were newly promoted men. I also know that the record for 1885 will be equally as good, if not better, showing most conclusively that the good effects of this system are permanent.

This system appeals to the men in two different ways. The roundhouse sheet shows their complete records, and all of the men who are desirous of being classed as careful, competent and economical runners, need no further incentive than the desire that their records may commend themselves favorably to the minds of all who see them.

The payment of a cash premium influences the man, the road to whose heart and mind lies through his pocketbook. When he sees men who are doubling perhaps on his own engine, make from $8 to $12 per month, he concludes that he is going to try for it also, and the first thing you know that man's record is as good as any of the others.

In other matters connected with the motive power, the introduction of this system will be found of indirect but decided advantage. It is a well established fact that if you teach a man to be careful in one direction, and keep hammering away at him, the care which he exercises in the discharge of his general duties will likely be increased in almost the same proportion. The power is kept in much better shape. The noise of escaping steam from the safety-valve is seldom heard. The boiler makers have less calking of flues to do on account of both runner and fireman striving to carry water and fire as near right as possible, and thus avoiding transition from one extreme of temperature to the other.

I could, from my own experience and observation, cite innumerable instances that prove all that the most enthusiastic friend of the system claims for it, but I must cease before the reader's patience is entirely exhausted. C.

Return to Light Rolling Stock.

To the Editor of the National Car-Builder:

In your October issue Mr. Wm. S. Huntington makes some remarks about locomotives that I am afraid may not have received sufficient attention from the master mechanics and locomotive builders of America; so with your leave, I will continue the subject. Mr. Huntington tells us that the modern locomotives work in a clumsy and unsatisfactory manner, and sighs for the good days of thirty years ago, when diminutive locomotives weighing from 18 to 22 tons pulled the trains of the period at speeds of from 50 to 65 miles an hour. These engines, he says, were great favorites till master mechanics "monkeyed" with and spoiled them. Most of the improvements tried since these halcyon days, he assures us have been failures, and the only hope he sees for efficient future service, is to take a step backward thirty years.

I have repeated the points made in Mr. Huntington's letter, because I wish to emphasize them and let our railroad managers know what they have lost by permitting master mechanics to run their machinery, when they might have obtained the wise council of Mr. Huntington and other roadmasters who never would have spoiled 20-ton engines that were capable of running trains 60 miles an hour. All of us who ever had anything to do with the old-time light locomotives know they were mostly splendid engines to run when they had no trains behind them, and they would be red hot all the time when the wood was good and they had no heavy work to do. Then they certainly were easy on the track; and as that is the first and last consideration in railroad operating, it follows that men like Mr. Huntington, who understand what is good and what is bad for the track, ought to reign supreme in the councils of railroad management.

But there is a familiar illustration of the evils which Mr. Huntington points out, to be seen in Boston every day. A train is run from Boston to Lowell, and is hauled by an immense locomotive that weighs about 45 tons. That engine rushes over the road at a speed of 50 miles an hour, and pulls 14 or 15 cars, about half of them sleepers —another abomination never thought of thirty years ago. Now just reflect on the tremendous blows that the wheels of that 45-ton locomotive must hammer upon every inch of the track between Boston and Lowell at such a speed and with such a train. No wonder that American railroads frequently go into the hands of receivers. An old time engine, such as Mr. Huntington remembers with lingering affection, could make the time easily with two of the Lowell train cars. Would it not be a wise and money-saving change on the part of the B. & L. management, to build small engines of the perfect type referred to, and run the train in seven sections, or put seven of the small locomotives in front to pull the whole train? They would certainly be much easier on the track than the 45-ton engine, and if the same policy were followed with all kinds of trains, steel rails would last for ever, and the services of roadmasters and trackmen could be dispensed with altogether. Roadmasters could then be utilized to take charge of the machine shops, and the section hands could do the locomotive and car repairs. A. MACCAY.

Valve-Oil Consumption.

To the Editor of the National Car-Builder:

Some of your readers may be interested in the following report made in August last by George F. Wilson, M. M. of the Minneapolis & St. Louis Railway, to W. H. Truesdale, Vice-President of the road, and referring to the comparative consumption of valve oil on different passenger engines during the months of June and July last. The runs were made between Albert Lea and Angus, engine No. 14 being equipped with our new sight-feed cylinder oilers, while engines Nos. 13 and 58 were not so equipped:

	June			July		
Engine.	Mileage.	Pints.	Miles to pint.	Mileage.	Pints.	Miles to pint.
13.....	2,324	36	65	2,750	36	76
58.....	1,880	30	63	2,754	40	69
14.....	3,750	32	116	2,754	16	172

NATHAN MFG. CO., New York.

Size of Locomotives.

To the Editor of the National Car-Builder:

Permit me to correct an error in the article on "Improving Compound Locomotives," in your October issue.

You say that a diameter of 21 inches for locomotive cylinders has not yet been attained in this country. The Philadelphia & Reading road has to my knowledge two Wootten passenger engines in regular service with cylinders 21 inches diameter and 22-inch stroke, and several more engines with cylinders of the same size were built and put in service by that company last summer. I think also that Ross Winans built two camel engines with 22-inch cylinders many years ago for the Erie road. The "Decapod" engine recently built at the Baldwin Works has 22 × 26 inch cylinders. J. SNOWDEN BELL.

PHILADELPHIA, October, 1885.

[The article referred to was from the *Mechanical World* (London), and was duly credited to that paper. What is said in it about the size of cylinders is correct as respects English locomotives. We willingly print Mr. Bell's letter lest other readers may have understood that the statements in the article applied to American locomotives.—ED. CAR-BUILDER.]

Novelties Exhibition Exhibits.

A. WHITNEY & SONS, car wheel manufacturers, Philadelphia, exhibit a sprinkling apparatus to be used in connection with an ordinary flask in casting car wheels, for the purpose of contracting the chill. After the chill has been expanded by the heat of the molten metal poured into the mould, it is made to contract again to its original size by the play of continuous jets of water upon its outer surface, thus maintaining contact with the inclosed casting long enough to insure a deeper and more uniform chill. The variations in the size of wheels, due to the varying temper of the metal, are also prevented by this process, and a more perfect roundness secured. The effectiveness of this apparatus is increased by dividing the interior face of "the chill" into sections.

The same firm also exhibit three models representing devices by which the windows of railroad cars, instead of sliding up and down in the usual way, may be opened from either side according to the direction in which the train is moving, and when opened be secured at any desirable angle. By this means dust and cinders will be excluded from the car, the car itself thoroughly ventilated by the motion of the train, and the opening of a window by one passenger can not inconvenience another. One of these models is so constructed that one side can not be opened without at the same time securely hinging and locking the opposite side, and in such a way that it can not be unlocked until the opened side is again closed.

An improvement for fitting up wheels to run loose on axles without axle collars, and excluding dust, is also exhibited, and in connection therewith, an improved pedestal for securing axles to car bodies. These last-named devices are being applied to mining cars.

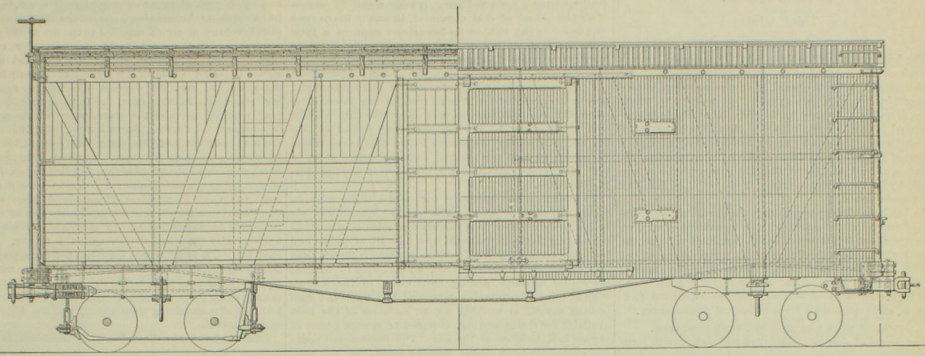
Preventing Smoke.

Of late years, there has been a remarkable awakening of interest among railroad officers on the subject of smoke prevention. It is no longer considered as a necessary and unavoidable evil for a locomotive to pollute the atmosphere with a dense cloud of smoke wherever the engine may be at work. The principles of combustion are daily becoming better understood, and every advance in this line of knowledge spreads abroad the belief that clouds of smoke rising from an engine proclaim the incompetency of those who are responsible for its appearance. The municipal authorities of several important cities are striving to enforce penalties to punish smoke-raising the same as any other nuisance deleterious to health and comfort. Little good had yet been done by ordinances against smoke, but the time is coming when ordinances of this kind will have to be strictly enforced.

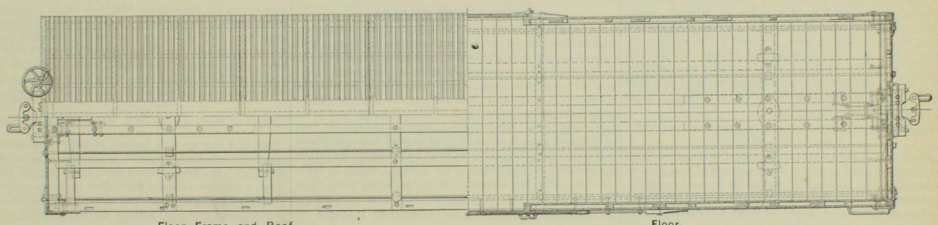
Many people otherwise well informed appear to think that there must be smoke, and plenty of it, wherever soft coal is burned, and that a liberal amount of smoke is a necessary accompaniment of heat production. The writer once saw a locomotive that was under his charge standing at a union passenger depot, and pouring out a dense stream of black smoke that was settling down on a crowded platform, causing extreme annoyance. We went up to the engineer and asked, Why don't you stop that smoke? The man was an old, experienced runner, but he looked up amazed, just as much as if he had been asked, why did he not carry his engine out of the way? Seeing his perplexity, we went and closed the dampers—of course they were open although steam was blowing off—opened the door, started the blower a little and held the shovel in at the door obliquely till a flame was started on top of the fresh coal. That stopped the smoke completely and the engineer was astonished. He acknowledged that he never heard of such a thing before.

The men in charge of the locomotives of America are suffering badly for want of missionary work that would teach the way of coal salvation. There are few railroads in this country that would not profit immensely in reduced operating expenses if they would send out apostles to teach the way of proper firing. During a recent visit to Buffalo, we were strongly impressed with the need of strict smoke-preventing ordinances, or of instruction to the engineers and firemen how to prevent smoke, for many of the locomotives around that city were the densest smokers we had noticed in wide-extended ramblings. Yet there is in Buffalo what we would regard as an excellent school for teaching all interested in the subject how thoroughly smoke can be prevented even with the softest of bituminous coal, if the proper means be taken. The electric light plant belonging to the Brush Electric Light Company, in Buffalo, is run by steam taken from six self-feeding Murphy furnaces, and although these furnaces are hard fired to supply steam for about 600 horse-power, no breath of smoke is seen issuing from the stack. The reason for this is, that the coal is supplied to the fire continuously, and no large amount of fresh coal is ever present. The system is perhaps hardly applicable to locomotives, but an examination of its operation could not fail to teach thoughtful locomotive men lessons about their work that would not readily be forgotten. Failing to find a more convincing means of teaching, it is good to tell men what can be done to prevent smoke and effect improved combustion, but showing them how the thing can be done is far more impressive, and we should think it would pay the railroad companies running into Buffalo, to induce all their engineers and firemen to visit the Brush electric light station frequently when the engines are at work. Mr. John F. Moulton, the president of the company, is an old time railroad officer, having been president of the Buffalo & Southwestern Railroad for years, and he takes such a lively interest in the economical operation of these furnaces that we are persuaded he would readily arrange to have men in search of information about them fully instructed.

FURNITURE AND WAGON CAR.—CHICAGO & NORTHWESTERN RAILWAY.



Sectional and Side Elevation.

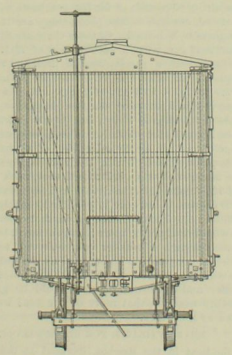


Floor Frame and Roof. Floor.

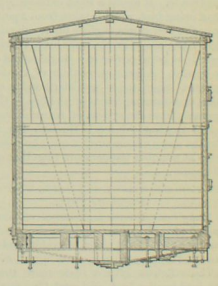
THE general dimensions of the car illustrated in the cuts are as follows:

Length over sills	38 ft.	0	in.
Width over sills	8 "	6	"
Length over roof	38 "	7¾	"
Width over roof	9 "	1¾	"
Length between inside lining	37 "	6¾	"
Width between inside lining	8 "	0¾	"
Height from floor to lowest part of rafter	8 "	5¾	"
Distance between sill and plate	8 "	5	"
Height from top of rail to top of running board	13 "	8¾	"
Length over face of draw-bar	40 "	11¾	"
Total wheel base	31 "	10¾	"

This car, as will be seen by the dimensions, is very much longer than the maximum length of standard box cars. In the details of its construction it does not differ materially from other box cars of the road; but for the service for which it is built it is a new departure, being specially designed for the transportation of furniture, wagons, agricultural implements and bulky articles that require a great deal of room in proportion to their weight. The capacity of these cars is rated at 40,000 pounds, or a load equal to the maximum capacity of other freight cars, the increased size making this possible, and at the same time providing sufficient space. The cars are mounted on the standard trucks of the road.



End Elevation.



Transverse Section.

Effects of Temperature on Car Lubrication.

A great source of loss to railroad companies in the beginning of each winter, is the delay in changing the grade of lubricating oil for cars to suit low temperature. A high grade expensive oil is often the cheapest lubricant for bearings, but we do not think this is the case for car work, save in exceptional cases, but it is certainly always economical to use oil adapted for the prevailing temperature. Oil that assumes below the freezing point the consistency of tallow is more expensive than is generally supposed. Some time ago, experiments were tried on one of the leading railroads of using good lard oil in summer and the best of sperm oil in winter for freight-car bearings, special care being taken to see that the supply was regularly maintained. The number of cars that could be hauled by each engine was thus increased about ten per cent., and greater regularity of service was secured. The saving effected in cost of transportation was sufficient to pay double the total cost of oil used and extra labor employed. An approximation of this result might be reached in ordinary practice with the cheap oils used, if proper care were taken to keep them liquid at low temperatures. The principal source of loss from the use of oils unsuitable for low temperature, is the increased power needed to haul the cars, but other incidental and resulting expenses come in. It seems paradoxical to say so, but frozen lubricants cause a great deal of trouble from hot boxes and cut journals. When a train has been standing on a cold night long enough at a station for the oil to freeze hard and the lie of the track—a down grade for instance—is such that the train can be started into rapid motion quickly, there will almost certainly be some hot boxes to attend to at the next station. The cause of the trouble in a case of this kind is, that the journals begin to cut before the oil thaws out to give lubrication.

Competitive Tests of Automatic Freight Car Brakes.

The Master Car-Builders' Committee on Automatic Freight Car Brakes invite the manufacturers of such brakes to a competitive test to be held at Burlington, Iowa, on Dec. 14, 1885, and on May 14, 1886. The conditions of the test will be as follows:

1. Each brake company will furnish, fitted with its device, 50 twenty-eight or thirty-foot box cars of 40,000 pounds capacity, delivering the same to the committee free of charge at some point on the Chicago, Burlington & Quincy Railroad, on or before Dec. 7, 1885, and leaving them in the hands of the committee till after the trial of May, 1886.

2. The owners of the brakes will be responsible to the car owners for mileage made from December 1885 to May 1886. Between the trials, the equipment will be kept on the lines of the Chicago, Burlington & Quincy Railroad, and that company will be responsible for any damage occuring to it while on its lines, that come under the rules of the Master Car-Builders' Association.

3. The December tests will be made while the brake attachments are new and in good condition; no brakes will be allowed on the engine, and hand-brakes only on the tank. Mechanical appliances for operating the car brakes from the engine or tank, will be allowed. The brakes must be fitted to both trucks, and with plain cast-iron shoes. Other details of the trials will be such as may be prescribed and agreed upon by the committee prior to the trial.

4. After the December trial, the brakes will be put into general service, receiving only ordinary repairs, a careful record of the cost of which will be kept. In May, 1886, the cars will be called in, and without being prepared for trial, the December tests will be repeated.

G. W. RHODES, Chairman.
GEO. HACKNEY,
BENJ. WELSH,
JOHN S. LENTZ,
W. T. HILDRUP,
Committee.

NOTE.—The committee will not provide equipment for these tests. Three or more competitors will be required before the tests will be entered into. Any brake company desiring to compete should at once communicate to the chairman of the committee.

THE recently finished passenger station of the London & Southwestern Railway, in London, is an immense structure of its kind. The area roofed in is 25 acres, and contains 15 platforms and 19 distinct lines of rails, making an aggregate length of four miles. The space occupied made it necessary to demolish 800 houses. It is over this railway with its 30 spur lines, that the traveler reaches the southern and southwestern counties, containing Portsmouth, Isle of Wight, etc.

Combustion in Locomotive Fire-Boxes.

BY ANGUS SINCLAIR.

Third Article.

ENERGY IN ONE POUND OF COAL.

The heat, and therefore the potential, mechanical energy contained in one pound of good coal, or in a pound of the hydro-carbon products of coal, is enormous when burned by combination with pure oxygen; but under the conditions of ordinary fire-box combustion the available heat of the coal is greatly diminished. Most people, if asked which contains the greater amount of potential energy, a pound of gunpowder or a pound of coal, would think the question absurd, and assert that the gunpowder was certainly by far the most powerful. Yet a belief of that kind s a popular error.

As has been already mentioned, the chemical combination of one pound of carbon with its equivalent of oxygen liberates about 14,500 units of heat. A heat unit, or the quantity of heat required to raise the temperature of one pound of water, one degree Fah. is, when applied to mechanical work, equal to raising 772 pounds one foot high. So $14,500 \times 772$ is equal to 11,194,000 foot-pounds, and represents a force of over $5\frac{1}{2}$ horse-power.

POWER OF COAL AND OF GUNPOWDER COMPARED.

One pound of charcoal combined with saltpeter to form gunpowder, would produce only about one-tenth the heat developed by the same weight burned in free oxygen. To quote Tyndall on the subject: "Saltpeter, or nitrate of potash, is formed by the combination of nitrogen, potassium and oxygen, one consequence of that combination being the generation of heat. To unlock the atomic embrace of the nitrogen, potassium and oxygen, an amount of heat must be expended equal to that generated by their union; and by this exact amount, the heat produced by combustion in salpeter would fall short of that produced by combustion in free oxygen."

CARELESSNESS AND IGNORANCE DIMINISH THE PRACTICAL VALUE OF COAL.

While this illustration may be useful to impress upon the mind the great power value of a pound of coal, it must be admitted that coal as used ordinarily in our locomotive fire-boxes, falls very far short of its theoretical efficiency. Various circumstances, many of them unavoidable, contribute to curtail the useful heat derived from coal; but it is undeniable that carelessness and ignorance are responsible for many of the losses that bring reproach upon the locomotive as a generator of power from coal.

UNAVOIDABLE CAUSES OF WASTE OF HEAT.

The discrepancy between the theoretical and the actual value of a pound of coal seems alarming when the calculation is first made. It seems a most extraordinarily imperfect way of using fuel, when it takes from 2 pounds of coal per hour in the best steam engines up to about 10 pounds with inferior engines to produce one horse-power per hour, when there is $5\frac{1}{2}$ horse-power in a single pound of charcoal properly burned. A large percentage of the loss goes off in the exhaust steam and is not attributable to faults of the furnace or mismanagement of the fire. Other losses are inseparable from the system of transmitting the heat of coal into mechanical work through the medium of steam, for the gases of combustion must be passed into the atmosphere at a higher temperature than that of the water inside the boiler.

GREATEST POSSIBLE WEIGHT OF WATER EVAPORATED PER POUND OF COAL.

When every heat unit in a pound of carbon is utilized and transferred to the water, one pound of fuel is capable of evaporating about 15 pounds of water, and one pound of carburetted hydrogen evaporates about 27 pounds of water. These figures give a little more than the total heat contained in the best coal, and they ought to be remembered by capitalists and others who are frequently requested to take stock in companies to build patent boilers represented as being capable of evaporating 40 or 50 pounds of water to the pound of coal.

AIR REQUIRED FOR COMBUSTION.

The quantity of heat per pound of coal available for steam-making is considerably below the figures of maximum evaporative power, and depends to a great extent upon the means taken to prevent waste. Each pound of coal burned in a fire-box has to heat all the volume of air that passes in to supply the oxygen to sustain combustion, and no small proportion of the heat units is absorbed in this duty before any heat can be utilized for steam-making, and is carried away to the stack, owing to the profusion of the supply. Water is not the only kind of a flood that tends to useless waste.

Each atom or 12 parts by weight of carbon in the coal, combines with 2 atoms or 32 parts by weight of oxygen, to form carbonic acid for the highest form of combustion; or to put the figures in a more intelligible way, 1 pound of carbon requires $2\frac{2}{3}$ pounds of oxygen for its perfect combustion. As 4.35 pounds of air are required to furnish 1 pound of oxygen, we have $4.35 \times 2\frac{2}{3} = 11.57$ pounds as the quantity of air that must pass into the fire-box for each pound of carbon consumed, even were the whole of the oxygen utilized in furnace combustion, which is by no means the case. To obtain fairly complete combustion, the fire must be saturated with air, so that sufficient oxygen shall reach the carbon and hydrogen to permit of chemical union. With the most favorable conditions of combustion in locomotive fire-boxes, with well-arranged draft appliances and good firing, it takes about 20 pounds of air per pound of coal consumed, to supply the oxygen required. Coal rich in hydrocarbons requires a little more air than anthracite coal, because each pound of hydrogen requires 8 pounds of oxygen and consequently $4.35 \times 8 = 35.80$ pounds of air to the pound of hydrogen.

A pound of air at average atmospheric temperature and pressure, occupies about 13 cubic feet, so our locomotives when well managed have to pass about 260 cubic feet of cold air through the fire-box for every pound of coal burned. An ordinary passenger locomotive burns about 25 pounds of coal per minute, so that about $25 \times 260 = 6,500$ cubic feet of air have to be provided to the fire during that time.

To illustrate the necessity for means being taken to supply as nearly as possibly the required quantity of air to the fire-box, a few more calculations must be given. As calculating the heat generated by a mixture of carbon and hydrogen combining with oxygen, is more complex than the calculation for carbon alone, and is likely to confuse the reader without adding materially to the knowledge of those who would comprehend the figures, I shall confine myself to working out an estimate of the heat available for steam-making, obtained from each pound of carbon in a locomotive fire-box. The figures will apply more correctly to an engine burning anthracite coal than to one burning bituminous coal, but the principles involved apply to both.

SPECIFIC HEAT OF THE GASES.

As oxygen combines with the carbon of the coal, the extent of the rise of fire-box temperature that ensues will depend upon the weight of the combining gases and the quantity of heat required to raise the temperature of 1 pound by 1 degree Fahr., which quantity is termed the specific heat of the gas. Most readers will understand that gases have different degrees of specific heat, just as liquids and solids have. The difference between the specific heat of different gases is about as great as that between water and iron, where a quantity of heat sufficient to elevate the temperature of one pound of the former 1 degree is sufficient to raise the temperature of the latter about eight times as high.

FIRE-BOX TEMPERATURE WITH DIFFERENT SUPPLIES OF AIR.

Taking 1 pound of carbon generating 14,500 heat units, and requiring 20 pounds of air for combustion, supposing complete combustion to take place, there are 21 pounds of mixed gases to be heated. Of these there are $3\frac{2}{3}$ pounds of carbonic acid gas, with a specific heat of .217, $9\frac{1}{2}$ pounds of nitrogen, with a specific heat of .244, and 8 pounds of atmospheric air, with a specific heat of .267. We have then $3.7 \times .217 + 9.33 \times .244 + 8 \times .267 = 5.212$ units, the heat required to raise the temperature of the whole mixture by 1 degree Fahr., and $14,500 \div 5.212 = 2,780$ degrees Fahr. is the elevation of temperature. The advantage of restraining the admission of air to the lowest possible point consistent with the full supply of oxygen, will be understood when it is stated that, with the admission of 12 pounds of air, the elevation of temperature would be 4,700 degrees Fahr. were it possible to supply sufficient oxygen for complete combustion from that quantity of air. There would really be no more heat generated, but it would be spread through a smaller volume, would tend to keep the fire-box temperature higher, and as the difference between the temperature of the water to be heated inside the boiler and the heating gases would be greater, the probability would be that more of the heat would be abstracted by the water.

HEAT AVAILABLE FOR STEAM-MAKING.

All the heat in the fire-box liberated by the union of carbon and oxygen, and calculated in the last paragraph, is not, however, available for steam-making. When a boiler is carrying a steam pressure of 140 pounds, the temperature inside the boiler is 360 degrees Fahr. It is manifest that the gases of combustion which maintain the temperature of the boiler by imparting heat through the fire-box sheets and tubes, must pass out through the smoke-box at a higher temperature than that of the water inside the boiler. Owing to the high rate of speed at which the gases are drawn through the tubes of ordinary American locomotives, the smoke-box temperature is generally very high, and 800 degrees Fahr. may be taken as a low average. Taking the temperature of the gases on entering the fire-box as 50 degrees Fahr., we have 750 degrees of heat that has been abstracted from the total heat of the furnace and passed out through the smoke stack. We found that it took 5.212 units of heat to raise the products of combustion 1 degree, and as 750 degrees have escaped into the atmosphere, we have $750 \times 5.212 = 3,909$ heat units wasted, leaving $14,500 - 3,909 = 10,591$ heat units as being available for steam-making.

LOSSES DUE TO EXCESSIVE AIR SUPPLY.

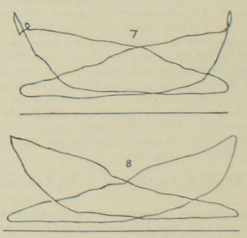
Several indirect losses result from the practice of passing more air through the fire than is needed to effect complete combustion. The lower temperature maintained in the fire-box leads to serious waste of heat from a portion of the gases passing away without being ignited, and the large volume of the gases that has to pass through the tubes induces a high velocity of flow that permits insufficient time for the heat to be absorbed while passing the heating surfaces. There is also a direct loss where a large volume of air is employed, even when the exhausted gases are at the same temperature as the escaping gases, over a case where a curtailed volume of air is supplied to the fire under proper conditions. Let us take two examples for calculation. When 12 pounds of air are admitted to consume 1 pound of coal, 13 pounds of gases pass into the stack at, say, 800 degrees, 750 degrees representing lost heat. In this case, 3,076 units would be the heat required to raise the temperature of the products of combustion 1 degree. So we have $3.076 \times 750 = 2,307$, the heat units lost, and this deducted from 14,500 leaves 12,193 units available for generating steam. On the other hand, suppose 25 pounds of air are supplied for each pound of coal burned, which is quite a common supply among our small nozzle locomotives, 26 pounds of gases will be discharged into the stack at a temperature also of 800 degrees, 750 degrees to be lost. In this case it requires 6.5 units to raise the gases of combustion 1 degree. So we have $6.5 \times 750 = 4,875$ heat units lost for each pound of coal burned, or 2,568 heat units more than when 12 pounds of air were admitted to the fire. In practice, 12 pounds of air per pound of coal would not be an economical way of maintaining combustion, but the illustration may be useful.

I have entered into these details at considerable length because I am aware that serious misapprehension prevails in many quarters respecting the quantity of air needed for combustion in locomotive fire-boxes. Many mechanical men act on the assumption that too much air cannot be supplied to the fire so long as it is put in through the grate bars. When the truth becomes established and generally recognized that the supply of air ought to be regulated, even through the grates, convenient and proper means will be provided to regulate that supply, a matter which receives extremely little consideration at present.

Effect of Hooking Down a High Speed Locomotive.

The fact is very well known among locomotive engineers that when a locomotive is running at a very high speed, with the reverse lever notched up to cut off very short, a decrease of speed will follow the dropping down of the lever a notch or two. The newspaper men who write stories about engineers getting up tremendous speed to meet some great emergency, always portray the man at the throttle as "hooking her down to the corner," although practical men are well aware that such a change would be a case of great hurry and little speed.

Although the fact is undeniable that hooking down a locomotive running at high speed leads to a reduction of speed, considerable diversity of opinion exists as to the cause of the slowing down. The writer has always held that it is due to excessive compression resulting from the large quantity of steam admitted not having time to escape. This view is strongly supported by indicator cards recently taken from a high speed locomotive belonging to the Philadelphia & Reading road, and published in the *Mechanical Engineer*.



By the courtesy of that paper we herewith insert two of the cards to illustrate the point in question. Card No. 8 shows an ordinary high speed diagram for a locomotive making 325 revolutions per minute, with 135 pounds boiler pressure, and cutting off at 5 inches—the stroke being 24 inches. Card No. 7, on the other hand, while taken at nearly the same speed and steam pressure as No. 8, shows an enormous back pressure and a small amount of power for the steam that was put into the cylinders. After the engine was running at a high speed, the reverse lever was dropped to cut off at 10 inches, and No. 7 diagram shows the distribution of steam under these conditions.

MR. D. BROCK, Superintendent of Transportation on the Missouri Pacific, is reported as saying that in his opinion the Eastern roads are fully ten years behind those of the West in the matter of appliances for lessening the cost of freight transportation. He had found automatic brakes that would stop a heavy train at the option of the engineer in one-third the time and distance that it could be done under similar conditions with hand-brakes and a crew of men; the meaning of which is that freight trains can be run at double their present speed if brakes can be had to control them, thus increasing the carrying capacity of the roads correspondingly.

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EDITORIAL ANNOUNCEMENTS.

Addresses.—*Business letters should be addressed, and drafts and money orders made payable, to* THE NATIONAL CAR-BUILDER. *Communications for the attention of the Editor should be addressed* EDITOR NATIONAL CAR-BUILDER.

Advertisements.—*Nothing will be inserted in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.*

Contributions.—*Articles relating to railway rolling stock, construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notices of changes in railroad officers, organizations and names of companies.*

Special Notice.—*As the* CAR-BUILDER *is printed and ready for mailing on the last day of the month, advertisements, correspondence, etc., intended for insertion, must be received not later than the 25th day of each month.*

DURABILITY OF AMERICAN LOCOMOTIVES.

A writer in the London *Engineer* recently, commenting on the condition of the locomotive building trade in Great Britain, remarked that, though engines of British make cost more than those made in America, the former were more durable than the latter and sold for more after they were worn out. As American locomotives are not built with a view to forming valuable scrap, they may, and they may not, be less valuable in that respect than engines made in Britain, and we do not care to waste time investigating the matter; but we do most decidedly take exception to the assertion that American locomotives are not equal in durability to those made in Britain. So far as the character of the material and of the work put upon the engines is concerned, we raise no question, for we are convinced that, as a rule, the locomotives made in both countries are first-class in every respect. But we have good reason for the belief that the flexible American locomotive is better adapted to endure hard service on any kind of track, good, bad or indifferent, than the more unyielding, though equally well built British engine. The most decisive test of an engine's durability is its capability of performing long mileage without having to stop for repairs. A comparison of the mileage sheets of leading English and leading American railways indicates that the locomotives on British railways make only about two-thirds of the miles annually run by American engines. In South America and Australia, where in some cases American and English locomotives are used on the same roads, the credit of superior durability is nearly always awarded to the former engines, even by engineers whose training is calculated to prejudice them in favor of the English type of engine. The Grand Trunk, and other Canadian railways, started out with locomotives built on the English plan, but experience has led the engineers in charge of the mechanical departments of these roads to adopt the American type of locomotive. These are facts which our contemporary will hardly venture to dispute.

Mechanical men who have given the subject attention do not require new statistics to convince them that the American locomotive is a wonderfully durable machine, considering the hard usage it is daily subjected to; but as others, who ought to be well informed, continue to remain ignorant about the work capabilities of the engine, we have collected a few facts that bear convincing testimony regarding the extraordinary durability of the locomotives turned out from American workshops. On April 23, 1883, engine No. 137, a passenger locomotive designed by Mr. A. B. Underhill, Superintendent of Motive Power, with cylinders 18 × 22 inches and driving wheels 66 inches diameter, was turned out of the Boston and Albany Railroad shops. After a few days of preliminary running on freight trains, this engine was put to running fast passenger trains, and up to August of this year had run 175,231 miles. From Mr. Colby, master mechanic at Boston, we learn that the regular run of this engine has been 200 miles per day on heavy fast express trains until the last five months, when she has not run on Sundays. But during any busy season or when locomotives were scarce, this engine did extra running, as was the case in May last, when she made 10,910 miles, or an average of 352 per day. The engine is still in good order and will not be taken in for general repairs for some months. In doing this enormous amount of work, all the repairs effected on the engine besides the minor running repairs, was turning the driving wheel tires once and facing the valves once. The division where most of the running was done is very crooked, and has curves of 10 degrees. In 57 miles an ascent of 893 feet is made, and in the next 41 miles the descent is 833 feet. The train, including engine and tender, generally weighed about 300 tons.

From Mr. Wootten, General Manager of the Philadelphia & Reading Railroad, we learn that their engine No. 44, built in 1857, has run 707,119 miles, or over 25,000 miles annually; engine No. 49, built in 1857, has run 750,794 miles, which is over 26,000 miles annually; engine No. 57, built in 1859, has run 676,574 miles; No. 58, built in 1859, has run 844,196 miles, or upward of 32,000 miles per annum; No. 76, built in 1863, has run 657,917 miles, or close on 30,000 miles annually; No 142, built in 1865, has run 630,260 miles; and No. 113 has since 1883 made a monthly mileage of 6,647 miles. Most of the Philadelphia & Reading Railroad engines are of Baldwin make, and all built within the last six years have the Wootten fire-box.

Mr. T. N. Ely, General Superintendent of Motive Power of the Pennsylvania Railroad, has furnished us with many particulars bearing on the mileage made by passenger and freight engines on long and short runs on the main line and branches of the road, and covering about 60 per cent. of the whole number in service. Of the passenger locomotives, 65 made an average of 31,707 miles annually, and the engines have an average age of 13 years. The freight engines made an average of 23,331 miles, 349 locomotives being represented by the figures, the average age of these engines being 13½ years. As an example of specially long mileage we may mention the case of engine No. 273, which, between September, 1875, and August, 1880, ran 251,552 miles and was not off her wheels during that time. During the months of June, July and August last, engine No. 1,047, on the Pittsburgh division, made 41,510 of a total mileage. In 1882, 72 passenger locomotives made an average of 45,936 miles each, the highest being 79,258 miles, the lowest 30,039 miles. In the same year, 175 freight locomotives made an average of 36,584 miles each, the highest mileage having been 58,711 miles, and the lowest 30,000 miles.

According to data received from Mr. H. Schlacks, Superintendent of Motive Power of the Illinois Central Railroad, we find that some old Rogers locomotives belonging to that road have performed extraordinary mileage since they were first built. No. 23, which Mr. Morris Sellers ran for some months thirty years ago, and did exceptionally hard service pulling gravel to fill up the ground where many of the principal tracks at Chicago are now laid, was built in 1853, and has 1,029,965 miles of a running record, or over 32,000 miles per annum of exceptionally protracted service. No. 25, built in 1854, has run 1,007,973 miles; No. 35, built in 1854, has run 1,015,488 miles. Of their recently-built engines, No. 221, put to work in 1880, ran 168,161 miles up to the end of August; No. 226, put to work in 1883, has run 82,437 miles to date, at an expense of 1.94 cents per mile for repairs. The oldest engines mentioned belonging to this company are still in service, and are in fair order. They might still be considered good for ten years' more work, only that they are getting too light for the heavy trains now handled all over the road.

Mr. Wm. Buchanan, Superintendent of Motive Power of the New York Central road, has supplied us with figures showing the mileage of a few of his passenger engines. These engines have cylinders 17 × 24 inches, driving wheels 69 inches diameter, steel fire-boxes of the Buchanan pattern, and the working weight of engine is about 35 tons. From July 1, 1884, to June, 1885, engine No. 12 ran 95,003 miles at an expense for repairs of 93 mills per mile; from Oct. 1, 1883, to Dec. 1, 1884, engine No. 82 ran 103,455 miles at an expense for repairs of 97 mills per mile; from July 1 1883, to Dec. 1, 1884, engine No. 84 ran 121,750 miles; from April 1, 1884, to June 1, 1885, engine No. 453 ran 105,135 miles; from Oct. 1, 1883, to April 1, 1885, engine No. 289 ran 140,546 miles; from Nov. 1, 1883, to Oct. 1, 1884, engine No. 338 ran 98,405 miles; from May 1, 1884, to July 1, 1885, engine No. 613 ran 118,256 miles. These figures are taken from thoroughly reliable records.

As it is almost impossible to obtain exact records of the work done and mileage made by American and British locomotives running on the same roads, the comparative durability of the two kinds of engines must continue to some extent to be a matter of uncertain speculation. But we would like to see figures given of mileage made by British locomotives that would compare with those we have quoted as being made by locomotives on leading American railroads.

THE CAR COUPLER QUESTION.

The agitation of this question has reached a stage at which the outcome, as respects the choice of one or more devices for the purpose of securing practical uniformity on freight cars, is involved in very great uncertainty. The merits of quite a large number of couplers will continue to be canvassed with unabated vigor during the ensuing six months, at the end of which the Executive Committee of the Car-Builders' Association are expected to make a report upon the performance of the twelve that were selected at Buffalo for further trial in regular service. A new starting-point, so to speak, will then be reached, but whether it will mark a forward or retrograde movement in respect to a final selection, can at present only be conjectured. In the mean time, it may be interesting, if not profitable, to briefly recapitulate what has been done since the Association began to take definite action, about a year and a half ago.

At the annual meeting at Saratoga, in June, 1884, the committee on the subject reported the names of sundry couplers, classifying them as "Worthy of Special Mention," and "Meritorious." After discussing the report, the Convention adopted a resolution recommending that "any railroads who may wish to experiment with those not belonging to the most mechanically perfect class—as the Janney or Cowell—to experiment with the Archer, Wilson & Walker, Ames, Conway-Ball, United States, Gifford and Mitchell."

The next event of importance in the selecting and weeding-out process, was the action of the Massachusetts Railroad Commissioners in September, 1884, in making trial-tests of a large number of couplers that had been tested in actual service, and in prescribing for use upon the railroads of that State, any one or all of the following devices, as the roads might elect, viz.: The United States, Ames, Cowell, Janney and Hilliard. In December following, a meeting of the representatives of sixteen New England roads was held in Boston for the purpose of agreeing, if possible, upon some one of these five couplers to be used by all the roads represented. There were 56 votes, apportioned on the basis of the number of cars owned. After dropping from the list three of the couplers that had received the smallest number of votes during four ballots, and narrowing the choice to the Ames and Cowell, two ballots were taken upon these, each ballot resulting in a tie—22 to 22. The meeting then passed a resolution asking the Executive Committee of the Car-Builders' Association to devise means for calling a national convention of railroad men to agree upon "a single standard automatic freight car coupler for all the roads in the country."

The next attempt to bring about concerted action was a call for a special meeting of superintendents, general managers and railroad commissioners, to convene at Fortress Monroe, in June, 1885, to consider the subject in conjunction with the members of the Car Builders' Association. The meeting was held, and after much fruitless discussion, the whole matter was referred to the Executive Committee, with power to arrange for a public trial of couplers at some central point. The committee took prompt action, resulting in the recent trial-tests at Buffalo, and the recommendation that the following named couplers be submitted to further tests in regular service on the roads, viz.: The McKeen, Perry, Archer, Gifford, Marks, Ames, Cowell, Dowling, Thurmond, Hein, Janney, and Titus & Bossinger.

An analysis of the couplers of which favorable mention had previously been made, shows that 7 of the 12 selected at Buffalo had received no previous official recognition, and that 4 that were recognized at Saratoga, and 2 that were prescribed by the Massachusetts commissioners, were ignored in the Buffalo list. This don't look like narrowing the thing down to a "single standard automatic freight car coupler." There is diffusion instead of concentration, and as the problem stands to-day, the ultimate selection of any one coupler, or a half-dozen or dozen for that matter, is hardly within the range of possibility. There is no clearly defined drift toward such a result, but, on the contrary, quite the reverse. There is too much friction and too little cohesion. We do not believe the Car-Builders' Association will ever agree to recommend *one* coupling device as a standard, or that the roads would voluntarily accept such a standard if it were recom-

mended. To do so would be to create something very like a monopoly. It would be a forced and unfair discrimination among a dozen or more devices equally meritorious, while many of those which would in such case be left out in the cold, have already been approved and adopted and are doing satisfactory work upon roads with large freight equipments. We need only refer to the United States, adopted as a standard on a half-dozen New England roads, the Gifford on the Erie, and the Ames on the continuous connecting lines between Boston and Chicago. It is possible to cast out and reject until a dozen or so remain unrejected, and this will be the number that will defy all attempts at further reduction. Wait till next June and see what shape the matter will then assume in the report to be made by the Executive Committee, and if the Association can agree upon nothing in the way of specific recommendation, it will really seem that the only solution of the problem will be the survival of the fittest. This, in our judgment, will be the final outcome of this mighty movement for the protection and safety of train men, no matter what compulsory laws may be passed by Legislatures.

Under existing circumstances, the apparent certainty of legislative interference is the stimulating cause of the recent and present agitation. The Legislatures and Railroad Commissioners of this, that or the other State, may, in prescribing what couplers shall be used, make discriminations, which, in the nature of the case, will be more or less arbitrary, but there is just as much likelihood that they will be as unable to agree upon a *universal* coupler—which is the professed aim of the whole movement—as the railroad companies or the Car-Builders' Association are now. Local legislation will not bring it about, because the evil to be remedied is not local, but ramifies through all the network of a vast interchanging traffic. The Solons may legislate as the Grangers did, and hasten like them to undo their work as soon as they discover what a mess they have made of it. And here it may be suggested that the validity of such laws, whether State or national, is yet to be determined by the courts when the issue is duly brought before them. The draw-bars and couplers now in use on the 700,000 or more freight cars of the country, must needs be utilized in some way until they are worn out, and this makes it necessary that any devices prescribed by law should be such as to be operated with the most of those now in use.

Suppose all the existing draw-bars and coupling devices were to be annihilated in a moment of time, and that six months or a year could be given to the roads to agree upon a universal substitute with which to replace them, is it likely that any such agreement would be reached? We think not. The same influences, preferences and interests that now prevail, would conspire to frustrate, as they are now doing, such a desirable consummation.

DEAD WEIGHT.

At the September meeting of the New England Railroad Club, Mr. Adams, of the Boston & Albany road, spoke of a 54-foot passenger car designed by Mr. Chamberlain, which weighed only 36,000 pounds, trucks and all, seated 70 passengers, and after six years of service was without a defect. This, it must be admitted, is a pretty good showing as respects the relative proportions of dead and paying weight. A great many passenger cars that seat a less number of persons weigh a good deal more than this, taxing the motive power with hauling an unnecessary quantity of non-paying weight, and to that extent diminishing the revenue of the roads.

Dead weight, however, as respects both passenger and freight cars, receives much less attention now among railroad men than it did a dozen years ago. In fact, it has ceased to be a bugbear, not on the theory that it costs nothing to haul non-paying weight, but mainly because the cost was formerly very much overrated by being based upon the cost of hauling freight per ton per mile as reported by the various roads, and overlooking the fact that the cost of hauling cars and engines must necessarily be included in the cost of hauling freight, because it is impossible to haul the freight without taking the rolling stock along with it.

Not very long ago, an enthusiast for economy who was for eliminating every pound of superfluous weight from passenger cars, sent to one of the railroad journals a calculation in figures which seemed to him to settle the matter beyond all dispute. A certain railroad company had built some new passenger cars, each weighing 51,500 pounds and seating 63 passengers, the dead weight per passenger being 818 pounds. The standard passenger cars of another road not very far away, weighed at the same time 42,100 pounds each, and seated 76 passengers, the dead weight per passenger being 554 pounds. Taking these facts for his premises, the dead-weight enthusiast proceeded to reason from them in this wise: If the heavier car had been made enough heavier to carry 76 instead of 63 passengers, at the rate of 818 pounds of dead weight for each of the additional 13, its weight would then have been 62,168 pounds, or 10 tons more than that of the lighter car. The cost of hauling this excess of weight was then put at 0.8 cent per ton per mile, which, on the total mileage of all the cars of its class on the road referred to, amounted to half a million dollars per year thrown away in hauling unnecessary dead weight. The rate, however, of $\frac{8}{10}$ of a cent per ton per mile as the cost of hauling the freight, including engines, cars and all, is a high estimate, some of the trunk lines reporting it at an average of $\frac{1}{2}$ a cent and even lower. On this basis the actual cost of hauling the whole train, freight and all, would not exceed $\frac{1}{2}$ of a cent per ton per mile, and under favorable conditions might be less than that even, thus lessening very materially the supposed cost of hauling the dead weight alone.

It must also be remembered that nearly 50 per cent. of the total operating expenses of a road is not affected at all by the relative proportions of dead and paying weight hauled, and that some of the other expenses that would seem to be directly affected, are only affected to a limited extent, and not in proportion to the dead weight. It costs something to haul this weight, of course, and there is a good deal of it in the better kinds of passenger cars in this country, and in first-class carriages on English roads, especially when in the latter case a lordling or some purse-proud dignitary appropriates a whole compartment to himself. But if he pays three or four times as much fare as the common class of passengers, the excess may fairly be credited to dead weight. It must also be noted that light-weight cars, while they tax the motive power less than heavier ones, may, if their strength is diminished in proportion to their lightness, require a larger outlay for repairs and suffer more in the general run of accidents. The dead weight scare, we repeat, is no longer the frightful thing it was a dozen years ago.

SLEEPING CARS.

Since sleeping cars, some twenty years ago, became an established feature of the passenger equipment of our roads, they have been elaborated and perfected to such a degree that it may be asked if the Pullman, Wagner, Woodruff and Mann types, collectively, are not the *ne plus ultra*, beyond which there can be nothing more commodious, luxurious or better. In view of the service performed and the conditions attending it, as contrasted with that of hotels and steamers, we should say that the margin for any further "blooming out" was not a very wide one. The merely ornamental details can, of course, be varied indefinitely, but so far as what is essential for comfort during a night ride is concerned, not very much more can be done.

The question, however, is not whether any thing more can be done in that direction, but whether sleeping cars, with all the substantial requirements of cleanliness and comfort, can not be provided at such reduced charges as to be acceptable to a large number of people who now prefer to ride in ordinary coaches rather than pay the extra $2 for a berth in a sleeper. There is no denying the fact that sleeping cars, as they are now, are not popular with the masses. There are numerous objections of a minor sort, but the chief one is the charge for berths. The present ruling rate is considered excessive, a piling on of all the public will stand, and the excess is very naturally attributed to the lavish outlay for costly upholstery and a profusion of embellishment designed for mere display and to gratify snobbish tastes. It is argued that these extravagancies are not needed to enable one to catch a few hours' sleep on a well-constructed railroad car; and the reasoning is correct as regards people who want to travel cheaply, and are not over-fastidious about contact with other people for the time being. Very many, also, who see the thing in this light, know something about stock company organizations, and the regular payment of from eight to twelve per cent. dividends upon a capitalized basis of $13,000 per car. This, so far as we know, applies only to the largest, oldest and most powerful of the sleeping car companies. It is no reproach to that or any other company to make fat dividends, but in this instance it shows that the rates charged yield a very handsome and well sustained profit.

There are two very distinct classes of people who want sleeping accommodations in cars, namely: the great mass of well-to-do people, who travel mainly for business or pleasure, and do not mind paying for luxuries in car decoration and furnishing; and the class who prefer plainer and cheaper surroundings because they can not afford to pay for anything better. The number of those who constitute this latter class in this country is rapidly increasing, and sooner or later the railroad companies will have to consider the expediency of providing for their wants. Emigrant sleeping cars have been in use for several years, but they are for special and not for general service. The question which it will be for the interest of the roads to consider before a great while, is whether a style of cars less costly than the regular sleepers now in vogue, would be likely to attract a paying patronage, and at the same time not lessen the patronage of the present sleepers. How the plan would develop can not, of course, be determined in advance, but it would be less novel and experimental than were the Pullman sleepers twenty years ago. These, and the Wagner cars, have had a steadily increasing popularity, the Woodruff only less so, and the Mann cars, although a marked departure from their predecessors in their interior construction, and but recently introduced in this country, are making steady progress in public appreciation.

Whether the cost of maintenance of a class of cars inferior to the Pullman and Wagner would be proportionately less may be questionable, but the difference, if any, is likely to be in favor of the cheaper and plainer cars. The first cost of such cars would at all events be considerably less, although it would not amount to a very large sum per passenger, when distributed over the whole life duration of the cars. The essential thing is to provide sleeping accommodations at reduced rates to people who object to the prices that are now charged, the roads at the same time deriving a profit from the service.

HOW COAL MIGHT BE SAVED.

The article on the coal premium system of the Pennsylvania Railroad which we print on another page gives a detailed and most interesting account of the best and most perfect premium system in use in America. The saving per engine does not appear very high compared with the coal used during the year anterior to the introduction of the system described, but it must be remembered that this premium system succeeded one which kept the enginemen to a far stricter account of the coal used than what is customary on other railroads. In considering the value of this premium system of coal accounts, it must be borne in mind that coal is much cheaper on the Pennsylvania Railroad system than it is on most other roads. The saving of $250 per engine per year is for coal estimated as being worth $1 per ton. Were the system applied on many Western roads in place of the existing arrangements which exercise practically no influence for fuel saving, we are satisfied that $1,000 per engine could easily be saved annually. That sum is small compared to the amount of money earned by the work of each locomotive, but the saving would be nearly sufficient to pay the expense of repairing the engines.

There is no question that the application of many mechanical devices to locomotives is calculated to effect a saving in fuel. Steam is not used so economically that less could not be made to do the work now done by a greater quantity, and there might be many improvements introduced that would reduce the temperature of the gases being passed into the atmosphere. Skill, ingenuity and perseverance are, however, required to apply the forms of improvement indicated, and great difference of opinion may rationally exist among accomplished mechanical engineers, as to the probable effect of structural changes proposed with the view of promoting economy of heat. But there ought to be no room for difference of opinion about the desirability of accomplishing saving, when all the changes to be effected are the introduction of the means of keeping an accurate record of fuel consumed. It is merely a slight change of method to keep the record of fuel consumed and work done by *enginemen* instead of *engines*, but the curtailment of waste that results from this change is by no means slight.

There is no line of economy in railroad management at the present day that promises results equal to that of stopping the rushing leaks resulting from senseless waste of fuel in locomotive firing. We know of no plan that will stop the leakage so effectually as the introduction of the premium system of coal accounts. Putting on traveling engineers well acquainted with the proper methods of firing and fuel-saving might do some good if these engineers would insist on their methods being followed. But it is an excessively difficult matter to get enginemen to change the free and easy style they have been brought up to, and which takes no thought of any higher duty than that of getting over the road comfortably. The proper and only effectual mode of inspiring the enginemen with zeal for fuel-saving is to make them pecuniarily interested in its results.

PROPOSED TESTS OF AUTOMATIC FREIGHT CAR BRAKES.

We publish elsewhere from the committee appointed by the Master Car-Builders' Association to investigate the subject of Freight Car Automatic Brakes, an invitation to the makers of brakes of that character, to submit their devices to a competitive test. The proposed method of performing the test would imply a very thorough and searching trial, not only of the efficiency of each brake when the whole apparatus is new, but of its capability to withstand the disturbing ordeal of continued service. A test based on the ability of a brake to effect prompt stops when every part is new, or in first-class condition, and handled by experts, is likely to produce very different results from what would be obtained after the cars have been subjected to the bumping and jerking of long freight train service. This fact has evidently been recognized by the committee, and they have arranged for something very different from the perfunctory test usually prescribed.

We are afraid, however, that some details of the prescribed conditions of tests may result in defeating the object of the committee by preventing the competition from taking place. Each competitor is required to equip 50 cars with his brake and send them to the Chicago, Burlington & Quincy road for five months of service. A competitive test will be held on Dec. 14, 1885, after which it is

proposed to put the cars into ordinary service and keep them going till May, 1886. The cars will then be collected and the tests repeated on the 14th of May without the brakes being repaired or in any way prepared for the trial. No brakes will be allowed on the engine, and only hand-brakes on the tender during the trial. There are really only two automatic brakes that have received extended application to service on freight trains, viz.: the Westinghouse and the American, and the condition that prevents the use of a power brake on the engine, puts the American brake at such a disadvantage that the owners cannot be expected to accept the terms. The Rote brake labors under the same disadvantage as the American brake in this respect. The assertion has been repeatedly made that a train of 50 freight cars is too long to be handled successfully by the Westinghouse automatic brake, so it looks as if the conditions of test were hardly within the practical limit. We trust, however, that three or more brake companies may see their way to accept the conditions, for the trial would certainly demonstrate, by a process of the survival of the fittest, which brake is best adapted for freight service.

THE letters which we publish elsewhere from master mechanics on material used in the construction of boilers and fire-boxes, give a thoroughly reliable account of what our principal railroads are doing in the line of boiler and fire-box construction. Steel is now the metal that has most advocates, but good iron sheets are still popular with some mechanical men, and a few use copper for select purposes. In drawing out these interesting letters, we had no proselyting purpose to serve. We merely wished to obtain an authoritative account of the prevailing practice in boiler and fire-box construction, an object in which we have been successful. Men who prefer iron or copper plate to steel, are not likely to be deterred by these letters from following their choice, and we have no desire that they should be. We give them credit for having sufficient professional knowledge to enable them to judge what metal is best for the peculiar influences to which their boilers and fire-boxes are subjected.

Discontent at Pullman.

Reports in Chicago say that the Pullman Car Company came very near having a big strike on their hands in the beginning of October. Business is brightening all over the West, and in consequence wages are beginning to look upward, but the Pullman Company reversed the natural order of things by making a reduction of 10 per cent. on men who, through the operation of the contract system, were already doing work very cheaply. The necessity for this move on the part of the company was reported to be the low figures at which they secured the contract for building 35 passenger cars and 2,200 freight cars for the Chicago, Burlington & Northern Railroad—the new Minneapolis branch of the Chicago, Burlington & Quincy. Competition for that order was very keen, and reports were freely circulated among the car-builders in attendance at the Grand Pacific Hotel, Chicago, on the day the contract was awarded, that the Pullman people would lose money on the work, even with their good facilities for production. No one dreamed that a reduction of wages would be made to save the company from loss. There is profound discontent among the men who have been reached by the reduction, and there is no doubt had they been as free to act as the workmen employed by other corporations are, a strike would have occurred. The Pullman Car Company are wise in their generation when they hold control of the homes of their workmen. That hold is all powerful for good or for evil.

A Standard Height for Miller Draw-Bars.

To the Members of the Master Car-Builders' Association:

At a meeting of the Executive Committee of the Master Car-Builders' Association, held in Buffalo on Sept. 16, the undersigned were appointed a committee to make a report to the Association, at its next annual convention, of the proper height of Miller draw-bars.

In order to report properly upon the subject, the committee desire to know what different heights are in use and have been adopted upon different roads of the country. To assist the committee in obtaining this information, will you fill in the answers to the questions asked below, and forward the same to the chairman of the committee at Packerton, Carbon County, Penn.

1. Do you use Miller draw-bars upon the cars run in your passenger equipment?

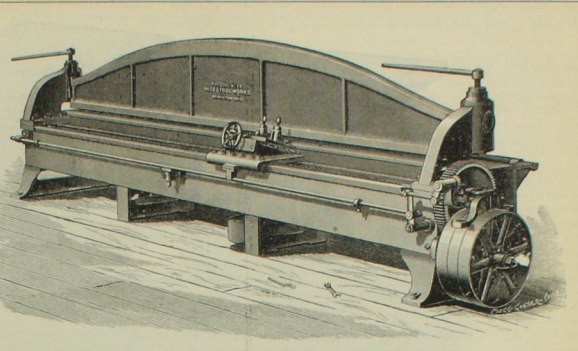
2. If yes, will you please state how many cars you have which are so equipped?

3. Please also state what is the standard height of these draw-bars as adopted by you, measured from the level of the top of rail to the centre of the Miller hook.

JOHN S. LENTZ,
ROBERT MCKENNA,
Committee.

OCT. 20, 1885.

MR. F. F. HEMENWAY, of the *American Machinist*, is going to publish in book form the series of articles on the "Indicator Diagram" from his pen, which appeared during the last year or two in the paper he is connected with, and attracted much admiring attention from mechanical engineers. Messrs. John Wiley & Sons are publishing the book, and are getting out an entirely new set of cuts for the diagrams and other illustrations. We are confident in saying that this will be the best book on the indicator that has appeared since Porter's book was published. A new work of this character is needed to illustrate modern steam engine practice, and we do not believe there is an engineer in America better qualified than Mr. Hemenway to prepare a book of the kind.



A NEW PLATE-PLANING MACHINE.

THE engraving illustrates an almost indispensable machine for a well equipped modern boiler shop.

Chipping the edges of plates by hand has got to be an antiquated method, slow and tedious, and the work is not nearly as satisfactory as when done by a plate planing machine. This machine will make a true and straight bevel, and the work is done in much less time. The modern plate planer is arranged to take cuts in each direction, so that the cut is continuous and not intermittent as with ordinary planers.

A planed sheet is much better in every respect than one chipped by hand or cut by a bevel shear. The latter leaves the edges so ragged as to be worse than if left square. The plate planer bevels the edge and squares up a narrow calking surface.

The machine is arranged to plane sheets 14 to 16 feet long at one setting, and any length by resetting. The housings are gapped to allow the sheet to be moved endwise for this purpose. There are two independent tools on the saddle, and the cut is taken in both directions. The saddle is carried by a large steel screw, supported at the center to prevent sag or deflection.

The plate is held by a heavy and substantial clamping-bar, held by a screw at each end only. This bar takes the strain of the work and is therefore a substantial casting. The clamping is done very quickly and securely. Brackets project out from the back of the bed, carrying rollers for supporting the plate and facilitating the handling.

The machine throughout is very substantial. It is built from new designs and patterns by the Niles Tool Works, of Hamilton, O.

New Publications.

THE SCIENCE OF BUSINESS. A Study of the Principles Controlling the Laws of Exchange. By Roderick H. Smith, New York. G. P. Putnam's Sons. Price, $1.25.

This book belongs to the "Questions of the Day" series of the publishers, and is in some respects a curious production, but is withal very interesting and highly instructive. It is a philosophical investigation of business phenomena wherein the constant rising and falling of commercial activity, the never ceasing fluctuations in the world of traffic are attributed to entirely original causes. The book is divided into two parts. Part first consists of two chapters, one on the Direction of Motion, the other on the Rhythm of Motion. These chapters form the text on which the remaining portion of the discourse is written. The author accepts Mr. Spencer's dictum, "Motion takes the line of least resistance or of the greatest traction, or of their resultant," and produces numerous facts to support the correctness of the law of the direction of motion as stated. "The rhythm of motion" represents that all creation animate and inanimate is constantly pulsating, that up and down in succession is the absolute law of the universe. Shakespeare's line,

"There is a tide in the affairs of men,"

is accepted as a fact rather than as a poetic fancy, and the movements of this tide are said to extend from the remotest particle of matter to the control of the heavenly bodies. The sum of the position taken is, that rest is nowhere; that wherever we find motion, that motion is in the line of least resistance or of greatest traction, or of their resultant, and that motion always is rhythmical.

Applying the laws that regulate these phenomena to ordinary business, the author finds that every resulting operation consists of a series of fluctuating movements. A man is active and inactive, weak, strong and weak again, and all his business transactions partake of his own condition. Communities are merely enlarged individuals, and their condition is similar to that of the single man, but increased according to the size and activity of the body represented. Considering the business of a community as a whole made up of innumerable motions, diversified and intricate, the conclusion is that the general movement of business in that community must be along the line of the least resistance, and as motion can not take place in one direction forever, there is constant reversal of motion between limits, or a rhythm. This theory of the motion of business the author supports by well-arranged facts relating to trade movements. By numerous diagrams drawn from the most reliable statistics, he shows that years of extreme depression are separated from each other by a period of from ten to eleven years. In this relation he shows that the condition of the iron trade very closely represents the condition of all other American industries. Subtract from the history of the country the history of the iron trade, and civilization as we know it to-day would not be possible. The intervals that separate periods of high or low prices in this trade are nearly uniform, and they have gone up and down at nearly the same rate, in times of peace and times of war, times of plenty and times of famine, with a regularity that seems to scorn the influences usually believed to control business. Our limited space prevents us from going more into the subject, or even glancing at the succeeding chapters on railroads, stocks, foreign trade, etc. The book is very readable and contains many important facts bearing directly upon matters of business that all men are interested in. The literary style, although very unpretentious, reminds us strongly at times of Smith's "Wealth of Nations."

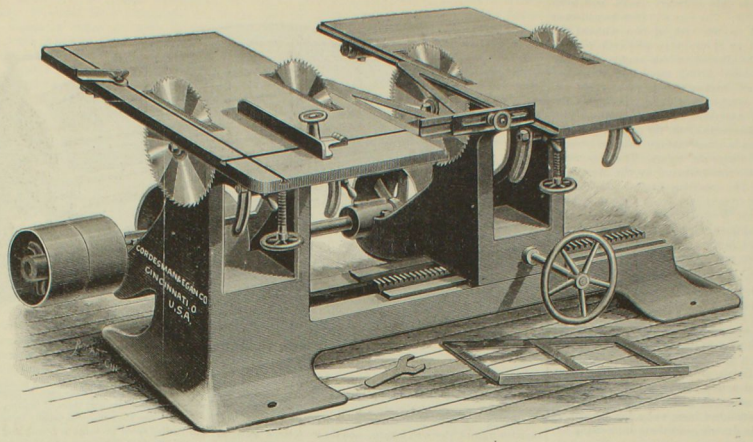
Sechrist's Hand-Book and Railway Equipment and Mileage Guide.—This well arranged and well printed manual is deserving of wide appreciation among railway men, but more especially by those in charge of the departments of car records. It contains lists of the passenger and freight equipment of all the roads in the country, with the numbers, dimensions, capacity, etc., of freight cars, the marks and equipment of freight lines and private car companies, and all information which is needed in making up, reporting and settling car mileage accounts. The October number contains 156 pages (9×12) which is a considerable increase in size since the earlier issues. The usefulness of such a hand-book depends, of course, upon its correctness, and to secure this indispensable feature requires persevering labor and the co-operation of hundreds of roads. That the work is in this respect a success, is evident from the fact that it meets the unqualified approval of the Car Accountants' Association, by which it has been officially indorsed and recommended, the report of a committee to that effect having been unanimously adopted at the annual convention of the association at Minneapolis in June last. It is issued monthly, at Cleveland, Ohio, by S. P. Sechrist.

Pocket Companion, Showing the Use of Wrought Iron on Railway Cars.—This is the title of a handsomely bound and illustrated volume of 163 pages just issued by Wilson, Walker & Co., Limited, of Pittsburgh, Pa. It contains engravings of a great variety of wrought-iron work used in car construction, embracing draw-bars, body-bolsters, equalizers, arch-bars, follower-plates, coupling links and pins, and other specialties of the manufactures of this firm. Specifications are given of material and tests of new bar iron and steel axles, and much other information relative to the improved processes and methods of the company in the manufacture of wrought car attachments and appliances. Some 70 pages of the volume are devoted to "Useful Information" in reference to weights, dimensions, strength, etc., of the various forms of iron and other metals, and many other things which will be appreciated by every mechanic, and which can readily be referred to by means of a complete index.

Free Niagara.—Under this title, Matthews, Northup & Co., Buffalo, N. Y., have published a handsomely got up pamphlet to supply information about Niagara under its emancipation to travelers and others interested in the wonderful cataract. The work tells the story of the gradual decline of Niagara Falls as a visitors' resort, owing to the blackmail levied at every point within sight of the falls, and then traces the history of the movement that succeeded in making the surroundings of the falls a state reservation. The pamphlet is beautifully printed and illustrated, the mechanical and artistic work being of a character that would be creditable to any metropolitan printing and engraving house. It is for sale at the *Buffalo Express* office, price 30 cents.

The Eames Vacuum Brake Co., of Watertown, N. Y., have published a superbly illustrated descriptive catalogue showing every detail of this style of brake, and explaining its operation, both as a plain brake, with no automatic action independent of the engineer, or as operated in conjunction with vacuum cylinders beneath the cars, by which means it can be applied or released from any part of the train as well as from the engine. The apparatus, in its combined application, is called the "Duplex" brake, and is much quicker and more effective in its operation, when a train breaks in two. This improved feature of the device was patented in 1881. Several forms of locomotive driver-brakes, manufactured by the company, are also shown in the plates, and are fully described.

The Egan Company, of Cincinnati, manufacturers of wood working machinery, have issued a new and comprehensive illustrated catalogue of their machines, all of which are of the latest designs and have many new points of advantage and convenience. The increased facilities of the company enable them to fit out at short notice any kind of wood-working establishment with a full complement of machinery of their own manufacture. Their catalogue will be furnished, and special prices quoted, to parties on application.



IMPROVED IRON FRAME DOUBLE CUT-OFF SAW.

THE engraving represents a machine recently introduced by The Egan Co., of Cincinnati, Ohio, and designed for use in furniture, carriage and car factories, or wherever a large number of pieces are required to be cut to the same length. The work that can be done on the machine ranges from 4 inches to 6½ feet in length. The changes for different lengths are very easily and quickly made, the space between the two tables being bridged over by an adjustable sliding fence. The tables can be raised up out of the way when it is necessary to take off saws. Every part is arranged for the convenience of the operator. When the inner saws are being used for cutting short pieces, the outer ones can be used for ripping, mitering, etc.

Master Car-Builders' Club.

The subjects to be discussed at the ensuing meetings of the club are announced to be as follows :

November : Rules of Interchange.

December : Car Wheels, and Fitting of Same to Axles.

January : The Subjects to be Discussed at the Next Annual Meeting of the Master Car Builders' Association.

February : Repairs of Cars by Contract.

March : Questions to be submitted for fifteen minutes' discussion by each member.

Railway Master Mechanics' Association.

The following are the subjects for discussion, and the committees appointed to report thereon, at the annual meeting to be held in Boston, June, 1886 :

Improvement in Boiler Construction : Geo. W. Stevens, Wm. Fuller, T. J. Hatswell.

Standard Driving-Wheel Centers and Standard Section of Tire : J. N. Lauder, Jacob Johann, H. N. Sprague.

Driving-Wheel Brakes : To what extent is their use advisable, and Best Method of Application : J. Davis Barnett, H. A. Whitney, F. M. Wilder.

Balance Slide Valves : Charles Blackwell, James Meehan, E. M. Roberts.

Best Material and Form of Construction for Locomotive Guides and Cross-Heads : A. J. Cromwell, William Swanston, A. Beckert.

Best Plan for Removing, Cleaning and Resetting Flues : Clem. Hackney, A. W. Sullivan, G. H. Prescott.

Shop Tools and Machinery : D. A. Wightman, A. J. Pitkin, F. B. Miles.

Hammer-Blow Tests of Locomotives : William Woodcock, Thos. L. Chapman, Coleman Sellers, Angus Sinclair, F. W. Dean.

Papers to be read by two Associate Members, viz. : Robert Grimshaw, John A. Coleman.

Boston Fund, Printing and General Supervisory Committee : J. D. Barnett, William Woodcock, Jacob Johann, Geo. Richards, J. H. Setchel.

Standing Committee on Subjects : James M. Boon, T. B. Twombly, Charles Blackwell.

Committee of Arrangements for Nineteenth Annual Meeting : J. N. Lauder, Geo. Richards, H. L. Leach.

THE Pennsylvania Steel Co. have got out a new magneto-electric signal for the protection of road crossings in districts where it is not thought necessary to keep a man for the purpose. The mechanism of the signal is put in action by an approaching train, and rings a double gong at the crossing which gives audible warning. The apparatus is very simple, and is likely to be effective. A modification of this signal would be very useful at railroad grade crossings in places where no signalman is kept. We know crossings of this kind out in the woods, where the only way of finding out if a train is approaching on the other road, is to stop and send a brakeman forward to look along the bisecting line. In certain conditions of the weather there is a strong temptation to dispense with this unpleasant duty, and accidents frequently occur after trains have followed the rule of stopping 500 feet short of the crossing.

A CIRCULAR has been issued by the United States Interior Department, saying that as 60 per cent. reduction of area in 70,000 pounds tensile strength steel virtually prevents makers from producing steel that will fulfill the requirement, the reduction of area required is modified. The reduction of area required for 70,000 pounds tensile strength boiler steel is now made 40 per cent.; of 65,000 pounds tensile strength steel, 50 per cent., and of 60,000 pounds tensile strength steel 55 per cent.

THE latest railroad invention is the arrangement of a telescoping frame of tubes running from buffer to buffer on cars. If a collision takes place these tubes gradually increase their resistance to the end of the train; the force of the blow is soon expended, and there are no splintered cars and no cars off the track. Experimentally, a train with this equipment attached was started down a steep grade and struck the stop-block without a particle of injury, the train coming gradually to a stop.

WE have received some remarkably good indicator diagrams taken from the locomotive which Mr. Mitchell, of the Lehigh Valley Railroad, recently constructed with the Strong valve-motion, illustrated as a part of the article on Radial Gears in our last issue. The diagrams were taken on up grades varying from 40 to 96 feet to the mile, at speeds of from 30 to 45 miles an hour while the engine was pulling 5 cars. They show an excellent distribution of steam, and at the highest velocity, while climbing the mountain, the engine gives a large card with little back pressure and a very small amount of compression. Steam can be cut off at 3 inches, or permitted to follow to 20 inches, the exhaust being worked at full stroke all the time. A single nozzle 6-inch diameter is used, and the engine steams very freely under all conditions of work with the fire door partly open.

FOUR consolidation locomotives, designed by Mr. R. D. Wade, Superintendent of Motive Power of the Richmond & Danville Railroad, and recently built for the road by the Baldwin Locomotive Works, are exceedingly heavy and powerful engines. When ready for work they weigh over 55 tons. They stand very high, and have a deep fire-box above the frames. The cylinders are 20 × 24 inches, and the driving wheels 50 inches diameter, the wheel base being 21 feet 6 inches. The boiler is straight, 58 inches diameter, and the fire-box crown is bound to the shell by radial stays 1 inch diameter. The fire-box is 8 feet 6 inches long by 41⅜ inches wide, and the depth varies from 61½ to 57½ inches. With a mean effective pressure of 100 pounds, which this engine ought to approach when working up to her full capacity, she will be capable of exerting a tractive force of 19,200 pounds.

A MASTER MECHANIC of wide experience, and one of the most successful mechanical men in the country, insists that the first requisite for doing work cheaply and promptly, is good modern tools. He thinks numerous railroad companies adopt a most expensive policy by keeping worn out tools out of the scrap heap, and by failing to provide their machine shops with new labor-saving appliances. To keep 100 locomotives in fair running shape, he calculates that the shop should have at least the following tools : 4, 16 or 18-inch lathes; 1 36-inch lathe for packing, etc.; 1 48-inch lathe for driving boxes, small tires, etc.; 1 wheel lathe; 2 10-inch lathes or 1 Fox lathe; 2 shapers; 1 8-foot planer; 1 planer large enough for frames; 1 Universal radial drill; 2 Post drills; 1 milling machine, and 2 slotting machines. He recommends that a full set of small tools be bought from standard makers. That is much more economical than getting just enough to start with, and then making inferior tools in the shop at high cost.

OUT of 230 locomotives belonging to the Cleveland, Columbus, Cincinnati & Indianapolis Railway, 211 were doing work during the month of August, and they made an average mileage per engine of 3,385 miles. The engines made 32.09 miles to the ton of coal, and 19.09 miles to the pint of oil. Repairs cost 3.27 cents; oil and waste, .33 cent; coal and wood, 3.27 cents; engineers and firemen, 5.51 cents; and dispatchers and cleaners, .31 cent; making a total cost of 12.79 cents per engine mile, which is a very good record. Mr. W. F. Turreff, General Master Mechanic, deserves credit for the work done, especially considering the fact that his facilities for doing work are very imperfect in the crowded quarters occupied by the shops.

THE United States Rocking Grate Bar Co., of Chicago, have sold to the City Steam Flouring Mills, Goulding, New South Wales, a full equipment of grates for their boilers. This grate is a Chicago invention, and is owned and made in that city. The company have also shipped grates recently to New York, Philadelphia, New Orleans, San Francisco and Dakota Territory.

Our Directory.

We note the following changes since our last issue. Our readers will do us a great favor by giving us prompt notice of any changes that may come to their knowledge or of any errors that may be noticed in our list :

Atlantic & Pacific.—Jas. G. McCuen has been appointed Superintendent of Motive Power and Machinery, vice Geo. F. Chalender, resigned.

Boston & Lowell.—George E. Shepard is appointed Purchasing Agent in place of F. H. Nourse, resigned.

Canadian Pacific.—This company having obtained control and possession of the North Shore Railway (Can.), that line will hereafter be operated as the Quebec Division, of which A. Davisi General Superintendent.

Chicago & West Michigan.—George C. Watrous is appointed Superintendent of Motive Power and Rolling Stock. The position of Master Mechanic is abolished.

Delaware & Hudson Canal Co.—H. G. Young has been appointed General Manager, vice C. F. Young, resigned. J. White Sprong has been appointed Comptroller and Purchasing Agent of the Northern Railroad Department. C. D. Hammond has been appointed Superintendent of the Saratoga and Champlain Divisions, and the several divisions composing the Northern R. R. department.

Detroit, Lansing & Northern.—George C. Watrous is appointed Superintendent of Motive Power and Rolling Stock. The office o Master Mechanic and Master Car-Builder is abolished.

Indianapolis & Vincennes.—M W. Mansfield has been appointed Superintendent.

Louisville & Nashville.—J. A. Harrahan succeeds Reuben Wells as General Manager, the latter having been appointed 2d Assistant to the President of the Co.

Missouri Pacific.—H. G. Fleming, late Superintendent of the Memphis & Little Rock, has been appointed Superintendent of the St. Louis, Iron Mountain & Southern Division, succeeding William Kerrigan, promoted to be General Superintendent of the whole Missouri Pacific system.

New York, Pennsylvania & Ohio.—W. M. Clements, formerly of the Baltimore & Ohio, has been appointed General Superintendent, to succeed Charles Paine, elected Vice-President of the New York, Lake Erie & Western.

Old Colony.—I. N. Marshall has been appointed Superintendent of the Northern Division in place of S. A. Webber, resigned.

Pennsylvania Company.—James McCrea has been appointed General Manager of all the lines operated by this company, with office in Pittsburgh. W. A. Baldwin will remain, as heretofore, Manager of the company's lines.

Pittsburgh, Cincinnati & St. Louis and Chicago, St. Louis & Pittsburgh.—John F. Miller has been appointed General Superintendent of these lines. J. J. Turner succeeds Mr. Miller as Superintendent of these Divisions of the Pennsylvania Company's lines.

St. Louis, Hannibal & Keokuk.—W. I. Brokaw has been appointed Master Mechanic.

South Florida.—A. B. Allen, formerly of the Burlington & Southwestern, has been appointed Master Car-Builder.

Texas & St. Louis.—J. W. Dickinson has been appointed Superintendent of Texas Division, vice Harry Flanders, resigned.

How natural it is to try to get *something* for *nothing*, and expect satisfaction in the use of materials that look well but have no real merit. This is exemplified in painting cars as much as anywhere. The Perfect Method Paints manufactured by us insure durability and saving of time otherwise lost in repainting, or loss by decay of the wood and rust of the iron when the paint has perished, as most of the ordinary paint soon does.

THE SHERWIN-WILLIAMS CO.,

CLEVELAND & CHICAGO.

Manuf'rs High Grade Paints and Colors for Railway use.

Established 1856.

Shipman & Bolen, Mfrs. of fine

Railway Varnishes.

Our Varnishes excel in durability,

Newark, New Jersey.

HARTMAN STEEL CO.
(LIMITED).
BEAVER FALLS, PA.

NAIL TRADE FOR MARK NAIL

Our Steel Wire Nails, both Barbed and Smooth, practically cost no more than the old-fashioned cut nails.

CHICAGO & ALTON RAILROAD CO.
OFFICE OF THE
SUPERINTENDENT MACHINERY
WM. WILSON
Sup't Machinery

BLOOMINGTON, ILLS. Nov 22nd 1884

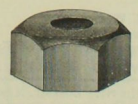
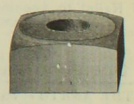
J. C. Massey Esq
Chicago Ill.
Dear Sir

Your favor 20th inst at hand and in reply will say that we equipped our New Machine Shop with your Vises and after one years service I have no hesitation in pronouncing them the best Vises that have ever come under my observation.

Yours truly
W. Wilson
Supt Machy

JAMES T. PATTEN,
RAILWAY EQUIPMENT.
REPRESENTING THE
Wason Mfg. Co., of Springfield, Mass. | Portland Company, of Portland, Me.
RAILWAY CARS, ETC. | LOCOMOTIVES.
18 BROADWAY (Welles Building), NEW YORK.

Rhode Island Tool Company,
MANUFACTURERS OF
COLD PUNCHED, SQUARE AND HEXAGON

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Specially Adapted for the Use of Locomotive and Engine Builders and Machinists Generally.

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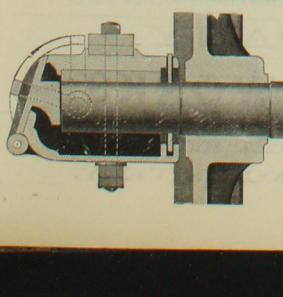
Master Car-Builders' U. S. Standard Thread Gauges. U. S. Standard Taps and Dies, both Hand and Machine. M. C. B. Standard Bar Iron Limit Gauges. Standard, Cylindrical Size Gauges, Drop Forged Steel Caliper Gauges. Standard Hand, Shell and Chucking Reamers. Hardened and Ground Mandrels, and Every Appliance in Tools or Special Gauges necessary for Standard Interchangeable Work. Combination Lathe Chucks, Renshaw Ratchet Drills, Corundum Wheels, etc.
☞ Prices and description furnished on application.



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This box is designed to provide an end stop for the axle, and thereby dispense with the shoulder and collar, and at the same time not obstruct the process of packing the box. The journal may be made any desired length and diameter. The life of the axle is doubled. The expense of brasses and lubricants enormously reduced; end wear of brasses and hot boxes obviated. It is now in successful operation on trucks of engines, tenders, passenger and freight cars. For further information address
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Important to Railroad Managers and Master Mechanics.
SIBLEY'S PERFECTION VALVE OIL.
More perfect lubrication insured, and entire freedom guaranteed from corrosion of cylinders and destruction of steam joints by fatty acids.
In exclusive use on 50 railroads.
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Combines all the best elements essential in a first-class Hammer.
Has more good points, does more and better work and costs less for repairs than any other Hammer in the World.
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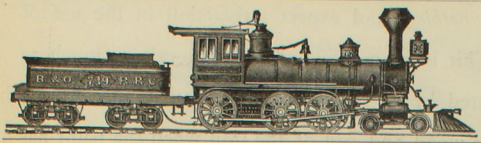

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From standard designs, or according to specifications, to suit purchasers.
Tanks, Locomotive or Stationary Boilers Furnished at Short Notice
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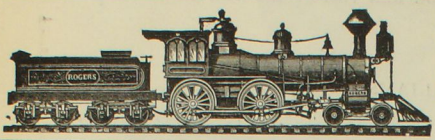

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New York Office, 44 Exchange Place.
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PROVIDENCE, RHODE ISLAND.
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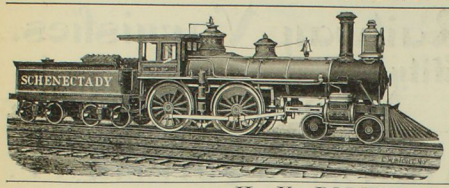

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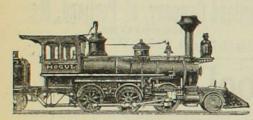

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All work steel-fitted and interchangeable. Duplicate parts kept in stock.
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THE ASHTON NOISELESS BLOW-BACK VALVE
Silent Relief to Locomotives.
Waste Steam used to heat Feed Water.
Restrains the use of Shovel.
Large Economy of Fuel.
Our Open-Pop Valve has an unrivaled reputation.
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PATENT PLANISHED SHEET IRON.
Patented March 14, 1865; April 8, 1873; Sept. 9 1873; Oct. 6, 1874; Jan. 11, 1876.
Guaranteed fully equal, in all respects, to the
IMPORTED RUSSIA IRON,
And at a much less price.
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Our Specialty.
For sale by all the principal Metal Dealers in the large cities throughout the United States, and at their office,
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The Seibert Cylinder Oil-Cup Co.,
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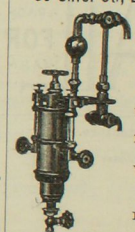

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DOUBLE SIGHT-FEED
Locomotive
LUBRICATORS,
Under the Gates, Seibert and other patents,
For Oiling Cylinders Continually, whether Up or Down Grade.
Also, Oiling Air-Brake Pump from One Cup.
Patent Approved by both the Eastern and Western Associations.

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We would call the attention of Master Mechanics and Master Car-Builders to our
PEERLESS BEARING METAL,
Claiming it to have more Anti-Friction qualities and to be more durable than any Bronze or Brass in the market.
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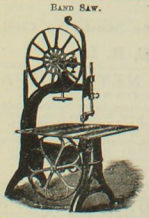

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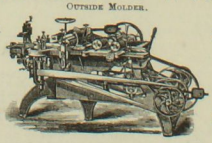

The Latest Improved
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for
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Planers, Vertical Car Tenoners, Gaining, Tenoning, Rotary Mortising Machines.
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MANUFACTURE CHARCOAL IRON EXCLUSIVELY.

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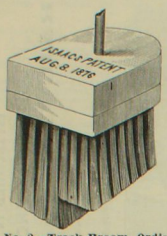
SUCCESSORS TO M. C. ISAACS & CO.,



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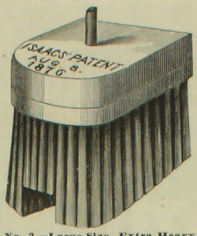
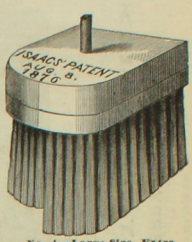
ISAACS' PATENT CELEBRATED

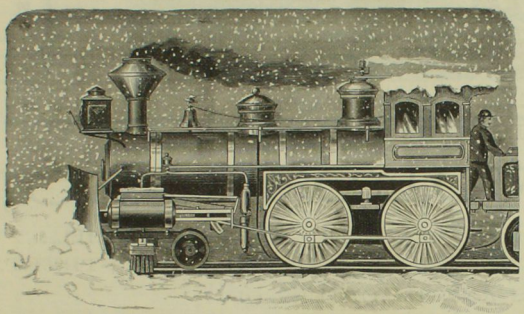


LOCOMOTIVE STEEL WIRE



No. 2.—Track Broom, Ordinary Size. No. 3.—Large Size, Extra Heavy. No. 4.—Large Size, Extra Heavy.

TRACK BROOMS.



This cut represents the Locomotive in full speed, and shows the condition of the track after our Broom has passed over the rail. Any Roads that have not used the Track Brooms should not fail to order them and test their merits.

CAUTION.

As we are the sole manufacturers of the Patent Steel Wire Track Broom, we have caused the following Brand to be placed on each, in compliance with the Patent Law:

For Removing Snow, Ice AND OTHER OBSTRUCTIONS FROM THE TRACK.

P. S. W. B. & B. CO., SOLE MFTRS., CHICAGO. ISAACS' PAT., AUG. 8, '76.

TRADE MARK.

NO ROAD SHOULD FAIL TO USE THESE BROOMS. THEY WILL REPAY THEIR COST.

NOTICE.

We are the sole owners of Letters Patent No. 180,717, granted M. C. ISAACS, Aug. 8, 1876, and we hereby caution all persons against infringing our exclusive rights by making, selling or using Railway Track Brooms like those covered by said Patent. We shall vigorously prosecute all infringers, under the provisions of the laws of the United States.

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SUCCESSORS TO
M. C. ISAACS & CO.

PHŒNIX STEEL WIRE BROOM & BRUSH COMPANY,
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Recommended by the Executive Committee of the Master Car-Builders' Association, U. S.

RAILROAD OFFICERS

AND OTHERS are invited to correspond with the company for further information.

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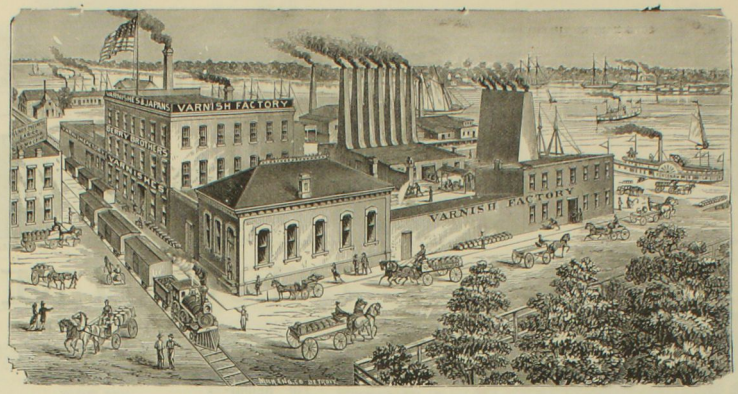
ESTABLISHED IN 1858. USE BERRY BROTHERS' RAILWAY VARNISHES.



Frontage on Wight Street, 218 ft.

Frontage on Lieb Street, 200 ft.

ESTABLISHED IN 1858. USE BERRY BROTHERS' RAILWAY VARNISHES.

B. R. MILLER, General Agent.

ESTABLISHED 1770.

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SPECIALLY PREPARED PAINTS FOR RAILROAD USE.

COACH COLORS IN JAPAN

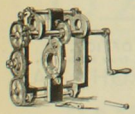
PURE COLORS DRY AND GROUND IN OIL.

FINE BRUSHES FOR CAR WORK.

DAVID B. CROCKETT'S "PRESERVATIVE" AND "SPAR COMPOSITION."

PATENT PORTABLE CROSS-HEAD

PIN TURNING MACHINE.



For turning CROSS-HEAD PINS or WRIST PINS when cast or forged solid in Locomotive Cross-Heads.

Descriptive circulars on application. Send stamp for Catalogue.

L. B. FLANDERS MACHINE WORKS,

PEDRICK & AYER, Proprietors,

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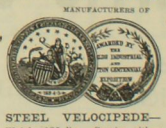
Awarded Gold Medal.



STEEL VELOCIPEDE—Weighs 135 lbs. Carries either one or two men. We guarantee it to be the **Lightest, Safest, Speediest and Most Durable** Car made. Runs backward or forward.

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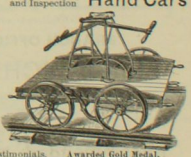

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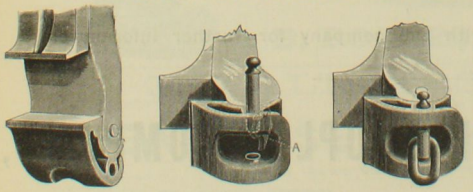
AUTOMATIC HOOK COUPLER AND AUTOMATIC LINK COUPLER COMBINED IN ONE DEVICE.

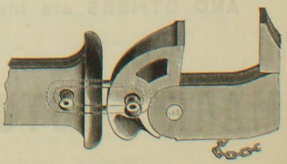
The Safest and Best Link Coupler among all the Vertical Planes. Couples in All Positions as a Hook, unless set not to couple.



It has been simplified and perfected, a Buffer added, locks wholly by Gravity; and now fits present timbers of cars without change. Costs much less than any other Hook. Can be set with or without slack. Couples with the Miller.

It may be seen on the Fitchburg and Lehigh Valley railroads, etc.; and the Cowell Passenger Coupler (working on the same principle) can be seen on railroads using the Cowell Platform and Coupling, some of them for two years.

For Blue Prints or further particulars, address



THE COWELL PLATFORM & COUPLING CO., CLEVELAND, O.

DIRECTORY

of the Railroads of the United States and Canada, showing the gauge, length of road, number of locomotives and number of cars; and giving the names and titles of their principal officers in charge of the operating, purchasing and rolling stock departments

A

Adirondack R. R. 4-8½ gauge 60 m. 3 lo. 62 cars.
C. E. Durkee, *Supt* ......Saratoga, N. Y.
Jacob Myers, *M. M.* ....Saratoga, N. Y.
Jas. J. Traver, *M. C. B.*........Saratoga, N. Y.
Addison & Northern Penn'a Ry. 3 g. 51 m. 5 lo. 50 c.
F. M. Baker, *Gen. Supt.* ....Addison, N. Y.
Alabama Great So'n R. R. (*See Cin., N. O. & T. P.*)
Albany & Susquehanna R. R. (*See D. & H. Canal Co.*)
Albemarle & Raleigh R. R. 4-8½ g. 33 m. 3 lo. 35 c.
Jas. H. Petty, *Gen. Supt.*........Tarboro, N. C.
Albert Ry. 4-8½ g. 51 m. 3 lo. 35 cars.
G. A. Robinson, *Man. & Pur. Agt.* Hillsboro, N. B.
Jas. McKay, *M. M. & C. B.*......Hillsboro, N. B.
Alexandria & Fredericksburg Ry. } *See Penna. R. R.;*
Alexandria & Washington R. R. } *(7) Div.*
Allegheny Valley R. R. 4-9 g. 259 m. 70 lo. 2202 c.
David McCargo, *Gen. Supt. & Pur. Agt.;* and
C. B. Price, *Supt.* (Riv. Div.).....Pittsburg, Pa.
A. A. Jackson, *Supt.* (L. G. Div.). Reynoldsville, Pa.
W. A. Wood, *M. M.*..........Verona, Pa.
R. Gunning, *M. C. B.*........ .. Verona, Pa.
Alliance, Niles & Ashtabula R. R. (*See Penna. Co.*)
Annapolis & Elk Ridge R. R. 4-8½ g. 20 m. 4 lo. 29 c.
W. H. Bians, *Supt. & Pur. Agt.*..Annapolis, Md.
John L. Beall, *M. Mach*........ Annapolis, Md.
Anniston & Atlantic R. R. 3 g. 9 m.
Tho. K. Scott, *Supt.* .... Anniston, Ala.
Antwerp & Paulding R. R. 4-8½ g. 6 m. 4 lo. 63 c.
E. C. Munson, *Gen. Man.* ....Antwerp, O.
William Fitzsimmons, Jr., *Pur. Agt.* Antwerp, O.
Arizona & New Mexico Ry. 3 g. 71 m. 3 l. 60 cars.
W. H. Jones, *Gen. Supt. & P. A.* Lordsburg, N. M.
W. C. Boylan, *M. M. & M. C. B.* Lordsburg, N. M.
Arkansas Midland R. R. 3-6 g. 63 m. 4 lo. 45 cars.
A. H. Johnson, *Pr. & Gen. Man.*...Helena, Ark.
J. B. Johnson, *M. M. & M. C. B.*...Helena, Ark.
Arkansas & Louisiana Ry. 4-8½ g. 28 m.
J. D. Beardsley, *Supt.*.........Washington, Ark.
Asheville & Spartanburg R. R. 5 g. 49 m. 2 lo. 12 c.
Jas. Anderson, *Supt. & Pur. Agt.*. Spart'b'g, S. C.
M. M............Spartanburg, S. C.
Ashland Coal & Iron Ry. 4-8½ g. 22 m. 7 lo. 432 c.
Douglas Putnam, Jr., *Gen. Supt.* Ashland, Ky.
Robt. Peebles, *Pur. Agt.*.........Ashland, Ky.
E. M. Roberts, *M. M.*........ .....Ashland, Ky.
Ashtabula & Pittsburgh Ry. (*See Penna. Co.*)
Atchison, Topeka & Santa Fé R. R.
4-8½ g. 2,620 m. 348 lo. 9,629 cars.
A. A. Robinson, *Gen. Man.*........ Topeka, Kan.
Geo. Hackney, *Supt. Mach.*........Topeka, Kan.
Clem. Hackney, *Asst. Sup. Mach. Dept.* do.
A. C. Armstrong, *Pur. Agt.*..... Topeka, Kan.
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Henry Hull, *G. F. Car Dept.*.....Topeka, Kan.
John Fagan, *M. M.*..............Atchison, Kan.
J. M. Smith, *M. M.*.........Kansas City, Mo.
Alfred Taylor, *M. M.*.............Emporia, Kan.
Mid. Div.: H. R. Nickerson, *Supt.* Nickerson, Kan.
W. Y. Johnson, *M. M.*....... Nickerson, Kan.
W. Div.: C. M. Rathburn, *Supt.*.....La Junta, Col.
A. C. Stiles, *M. M.*.... ..... La Junta, Col.
D. H. Dotterer, *M. M.*...............Raton, N. M.
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F. B. Woodruff, *M. M.*......Las Vegas, N. M.
J. H. Holman, *M. M.* ....Wallace, N. M.
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E. Hackett, *M. M.*.........San Marcial, N. M.
H. P. Olcott, *M. M.*.. .... .Deming, N. M.
Geo. A. Hancock, *M. M.*.......El Paso, Tex.
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Kan. Cy., Law. & So. Kan.
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Atlantic & Danville Ry. 3 g. 17 m.
E. G. Sweatt, *Gen. Man.*..........Waverly, Va.
Atlantic & North Carolina R. R. (*See Midland; N. C.*)
Atlantic, Tenn. & Ohio R. R. (*See Rich. & Dan.; (2) Div.*)
Atlantic & Pacific R. R. 4-8½ g. 575 m.
D. B. Robinson, *Gen. Man.* Albuquerque, N. M.
G. Supt.........Albuquerque, N. M.
F. P. Wherry, *Pur. Agt.*...........St. Louis, Mo.
J. G. McCuen *S. M. P. & M.* Albuquerque, N. M.
B. C. Bosworth, *M. M.*............Coolidge, N. M.
Augusta & Knoxville R. R. (*See Port Royal & Aug.*)
Austin & Northwestern R. R. 3 g. 60 m. 5 lo. 75 c.
J. A. Rhomberg, *Gen. Man.*.. .... Austin, Tex.

B

Bachman Valley R. R. (*See Han. Junc., Han. & Gett.*)
Balt. & Delaware Bay R. R. 4-8½ g. 50 m. 2 lo. 13 c.
Fred Gerker, *Gen. M. & P. A.* Chestertown, Md.
Baltimore & Hanover R. R. (*See H. J., H. & G.*)
Baltimore & Ohio R. R.
4-8½ g. 1,612 m. 574 lo. 17,339 cars.
B. Dunham, *Gen. Man.*.......... Baltimore, Md.
N. S. Hill, *Pur. Agt.*.... ......Baltimore, Md.
Main Stem Div.: 4-8½ g. 972 m.
W. M. Clements, *Gen. Supt.*...Baltimore, Md.
A. J. Cromwell, *M. of M.*.... ..Baltimore, Md.
E. W. Grieves, *M. C. B.*.. ......Baltimore, Md.
Andrew Beckett, *M. M.*..... .Baltimore, Md.
Wm. Edwards, *M. M.*...Martinsburg, W. Va.
Sam. Houston, *M. M.*........Piedmont, W. Va.
Robert Maxwell, *M. M.*.......Cumberland, Md.
W. P. Harris, *Supt. West of* Cumberland, Md.
S. B. Crawford, *M. M.*.. ......Grafton, W. Va.
Alex. Laird, *M. M.*.......Parkersburg, W. Va.
W. B. McClung, *M. M.* .....Wheeling, W. Va.
Pitts. Div.: H. P. Harris, *Supt.*.... .Pittsburgh, Pa.
I. N. Kalbaugh, *M. of M.*.......Pittsburgh, Pa.
Trans-Ohio Divs.: G. J. Foreacre, *G. Supt.* Newark, O.
W. H. Harrison, *M. of Mach.*..... ..Newark, O.
E. L. Weisgerber, *M. M.*....... ....Newark, O.
H. M. Ingler, *M. M.*.. ....Bellaire, O.
O. B. Perkins, *M. M.*...............Zanesville, O.
Thos. Taylor, *M. M.*.... ....Sandusky, O.
F. J. Gunther, *M. M.*.....Chicago Junction, O.
Chi. Div.: F. H. Britton, *Supt. Trans.* Chicago, Ill.
Benj. Lowther, *M. M.*.... .... Garrett, Ind.
C. H. Campbell, *M. M.*.... . So. Chicago, Ill.
Newark & Straitsville Div.: N. Criswell, Shawnee, O.
Baltimore & Philadelphia. 4-8½ g. 40 m. 7 lo. 35 c.
B. Dunham, *Gen. Man.*..........Baltimore, Md.
Jas. McCreighton, *Supt.*......Wilmington, Del.
Baltimore & Potomac R. R. (*See Penna. R. R.; (7) Div.*)
Bangor & Piscataquis R. R. 4-8½ g. 63 m. 4 lo. 87 cars.
Arthur Brown, *Supt. & Pur. Agt.* Bangor, Me.
C. S. Nason, *M. M.* ....Bangor, Me.
J. W. Comins, *M. C. B.*... .. .... Oldtown, Me.
Bangor & Portland Ry. 4-8½ g. 25 m. 3 lo. 3 c.
C. Miller, *Pres. & Gen. Man.*...Blairstown, N. J.
Barclay R. R. 4-8½ g. 16 m. 6 l. 200 c.
F. F. Lyon, *Supt.*..................Barclay, Pa.
J. A. Hardenburg, *Pur. Agt.*..21 Cort. st., N. Y.
Wm. Johnson, *M. M.*............. Towanda, Pa.
Batesville & Brinkley R. R. 3 g. 40 m. 3 lo. 42 c.
R. W. Martin, *Pres.*........ ....Little Rock, Ark.
W. J. Thompson, *Gen. Man.*..Little Rock, Ark.
Jas. Harrington, *Gen. Supt.*......Brinkley, Ark.
John White, *M. M.*...............Brinkley, Ark.
Bath & Hammondsport R. R. 3 g. 10 m.
Allen Wood, *Gen. Man.*..Hammondsport, N. Y.
Baton Rouge, Grosse Tête & Opelousas R. R.
5-6 g. 29 m. 3 lo. 12 c.
D. C. Montan, *Gen. Supt.*........Port Allen, La.
Bedford & Bloomfield Ry. 3 g. 43 m. 5 lo. 86 cars.
Jas. W. Kennedy, *Gen. Supt. & Pur. Agt.;* and
Capt. John Thumser, *M. M.*.......Bedford, Ind.
Jas. Richards, *M. C. B.*...........Bedford, Ind.
Bellaire, Zanesville & Cin. Ry. Co. 3 g. 112 m 5 lo. 71 c.
S. L. Mooney, *Pres. & Gen. Man.* Woodsfield, O.
C. E. Hill, *M. M.*.......................Zanesville, O.
Bell's Gap R. R. 4-9 g. 25 m. 5 lo. 148 cars.
R. G. Ford, *Supt. & Pur. Agt.*....Bellwood, Pa.
Geo. Van Brunt, *M. M.* ....Bellwood, Pa.
A. Zimmerman, *M. C. B.* ....Bellwood, Pa.
Belt R. R. 4-8½ g. 12 m. 10 lo.
W. P. Ijams, *Supt.*...........Indianapolis, In.

Belt Ry. 4-8½ g. 27 m.
Jas. D. Carson, *Gen. Man.*..........Chicago, Ill.
R. W. Johnson, *M. M.*...............Chicago, Ill.
Bennington & Glastonbury. 4-8 g. 10 m.
R. C. Root, *Pres.* ... .Bennington, Vt.
Bennington & Rutland Ry. 4-8½ g. 59 m. 10 lo. 236 c.
E. D. Bennett, *Supt. & Pur. Agt.* Bennington, Vt.
Ghas. McMasters, *M. M.*...........Rutland, Vt.
Berlin Branch R. R. (*See Han. Junc., Han. & Gett.*)
Bladen, Columbus & Florida. 4-8½ g. 16 m. 21 o. 2 c.
John Colville, *Pres.*...... ...Wilmington, N. C.
Bodie & Benton Ry. & Com. Co. 3 g. 34 miles.
Thomas Holt, *Supt. & Pur. Agt.*.... Bodie, Cal.
E. H. Barton, *M. M. & C. B.*.........Bodie, Cal.
Boston, Barre & Gardner. 4-8½ g. 37 m. 8 lo. 108 c.
Supt. & P. A...Worcester, Mass.
Frank I. Goodwin, *M. M.*.... Worcester, Mass.
Boston, Hoosac Tunnel & W'n Ry.
4-8½ g. 87 m. 18 lo. 1,038 cars.
H. L. Morrill, *Gen. Man.*..Mechanicsville, N. Y.
C. H. Cory, *Pur. Agt.*....Mechanicsville, N. Y.
C. H. Cory, *Supt. & M. M.* Mechanicsville, N. Y.
John S. Ellis, *M. C. B.*.....Mechanicsville, N. Y.
Boston, Revere Beach & Lynn R. R. 3 g. 9 m. 7 lo. 55 c.
C. A. Hammond, *Supt. & P. Agt.* Boston, Mass.
R. D. Sutherland, *M. M.*...... ...Boston, Mass.
John Coghlan, *M. C. B.* ....Boston, Mass.
Boston, Winthrop & Point Shirley R. R.
3 g. 10 m. 1 lo. 8 c.
C. A. Parks, *Supt.*....... ... .Boston, Mass.
J. W. Davis, *M. M.*... .. ..Winthrop, Mass.
Boston & Albany R. R. 4-8½ g. 372 m. 245 lo. 6,111 c.
W. H. Barnes, *Gen. Man.*.. ...... Boston, Mass.
Edw. Gallup, *Gen. Supt.*......Springfield, Mass.
A. B. Underhill, *Supt. M. P.*...Springfield, Mass.
F. D. Adams, *Gen. M. C. B.*.......Allston, Mass.
J. T. Chamberlain, *For. C. Shop.* Allston, Mass.
H. B. Chesley, *Div. Supt.*.... ...Boston, Mass.
G. H. Colby, *Div. M. M.* ....Boston, Mass.
C. E. Grover, *Div. Supt.*....Springfield, Mass.
H. W. Eddy, *Div. M. M.*....Springfield, Mass.
J. B. Weston, *For. Car Sh.* Springfield, Mass.
W. H. Russell, Jr., *Div. Supt.* E. Albany, N. Y.
T. B. Purvis, *Div. M. M.*..East Albany, N. Y.
J. E. Doran, *For. Car Sh.*..East Albany, N. Y.
Boston & Lowell R. R.
4-8½ g. 555 m. 147 lo. 3,262 cars.
C. S. Mellen, *Gen. Supt.*...........Boston, Mass.
Geo. E. Shepard, *Pur. Agt.*.... ...Boston, Mass.
Jas. K. Taylor, *Supt. R. S. & M.* Concord, N. H.
So. Div.: J. F. Crockett, *Supt.*... ..Boston, Mass.
H. S. Kolseth, *M. M.* ... .Boston, Mass.
No. Div.: Geo. A. Todd, Supt ...Concord, N. H.
Geo. E. Shepard, *Pur. Agt.*...Concord, N. H.
C. C. Aspinwall, *M. M.* ....Concord, N. H.
Wh. Mt. Div.: W. A. Stowell, *Supt.* Woodsville, N. H.
Geo. A. Ferguson, *M. M.*.. .Lake Village, N. H.
Boston & Maine R. R. 4-8½ g. 491 m. 209 lo. 4,660 c.
J. T. Furber, *Gen. Man.*.........Boston, Mass.
Geo. J. Fisher, *Pur. Agt.*.........Boston, Mass.
Wm. Smith, *Supt. M. P.*.........Boston, Mass.
D. C. Richardson, *M. C. B.*....Lawrence, Mass.
West. Div.: Wm. Merritt, Jr., *Supt.* Boston, Mass.
East. Div.: D. W. Sanborn, *Supt.*..Boston, Mass.
North Div.:
J. W. Sanborn, *Supt.*..Wolfboro Junc., N. H.
Boston & N. Y. Air Line R. R. (*See N. Y., N. H. & H.*)
Boston & Providence R. R. 4-8½ g. 67 m. 52 lo. 1,006 c.
A. A. Folsom, *Gen. Supt. & P. A.* Boston, Mass.
Geo. Richards, *M. M.*.... .....Roxbury, Mass.
Jno. Lightner, *M. C. B.*.........Roxbury, Mass.
Bowling Green & Toledo R. R. 4-8½ g. 6 m. 2 lo. 4 c.
Wm. A. Wiggins, *Gen. Man.* Bowling Green, O.
Wm. A. Wiggins, *Pur. Agt.*..Bowling Green, O.
Bradford, Bordell & Kinzua R. R. 3 g. 42 m. 6 lo. 82 c.
Bradford, Eldred & Cuba. 3 g. 54 m. 6 l. 158 c.
Tonawanda Valley & Cuba. 3 g. 60 m. 5 lo. 31 c.
J. V. D. Loomis, *Supt.* ....Attica, N. Y.
Jno. Delaney, *M. M. & C. B.*......Bradford, Pa.
Brattleboro' & Whitehall R. R. 3 g. 36 m. 3 lo. 56 c.
(*Operated by Central Vermont.*)
Bridgton & Saco River R. R. 2 g. 16 m. 2 lo. 19 c.
Wm. F. Perry, *Gen. Supt.*...... .. Bridgton, Me.
M. M. Caswell, *M. M. & Pur. Agt.* Bridgton, Me.
Brighthope Ry. 3 g. 37 m. 4 lo. 193 cars.
Jas. R. Worth, *Supt.*.... ....Richmond, Va.
P. M. Buckingham, *Pur. Agt.* Richmond, Va.
A. Gary, *Supt. Way & Works.* Winterpock, Va.
Robt. Kredell, *M. M.*.... ....Chester, Va.
Brooklyn, Bath & Coney Island R. R.
4-8½ g. 7 m. 8 lo. 36 cars.
Geo. A. Gunther, *Gen. Man.*...Brooklyn, N. Y.
Aug. Wolff, *M. M.* ....Brooklyn, N. Y.
Brooklyn, Flatbush & Coney Island Ry.
4-8½ g. 8 m. 8 lo. 54 c.
J. L. Morrow, *Supt. & P. A.*...Brooklyn, N. Y.
Wm. Finley, *M. M.*............Brooklyn, N. Y.
Brooklyn & Rockaway Beach R. R.
4-8½ g. 3 m. 2 lo. 18 cars.
Wm. Warner, *Supt.*.. ....East New York, N. Y.
Brunswick & Western R. R. 5 g. 172 m. 13 lo. 170 c.
A. A. Gaddis, *Gen. Man. & P. A.* Brunswick, Ga.
J. K. Nightengale, *Pur. Agt.* ...Brunswick, Ga.
W. R. Kline, *M. M.* ....Brunswick, Ga.
Buff., N. Y. & Phil. R. R. 3 & 4-8½ g. 655 m. 120 l. 6,339 c.
Geo. S. Gatchell, *Gen. Supt.*..... Buffalo, N. Y.
W. W. Halsey, *Asst. to G. Supt.*..Buffalo, N. Y.
Allen Vail, *M. M.*..................Buffalo, N. Y.
Buff. Div.: Henry Dwyer, *Supt.*.... Buffalo, N. Y.
Roch. Div.: J. R. Watson, *Supt.*... ..Olean, N. Y.
Pitts. Div.: E. H. Witter, *Supt.*......Oil City, Pa.
H. J. Bookhammer, *M. M.*........Oil City, Pa.
C. E. Turner, *M. M.*..... ....Olean, N. Y.
Burlington, Cedar Rapids & Northern Ry.
4-8½ g. 989 m. 96 lo. 4,206 cars.
C. J. Ives, *Pres. & Gen. Supt.* Cedar Rapids, Ia.
Robt. Williams, *V. P. & G. Supt.* Cedar Rapids, Ia.
T. Stickney, *Pur. Agt.*..... ...Cedar Rapids, Ia.
R. W. Bushnell, *M. M. & C. B.* Cedar Rapids, Ia.
Burlington & Lamoille R. R. 4-8½ g. 35 m. 4 lo. 64 c.
G. L. Linsley, *Gen. Man. & Supt.* Burlington, Vt.
F. G. Brownell, *M. M.*......... Burlington, Vt.
Burlington & Mo. Riv. R. R. (in Neb.) (*See C. B. & Q.*)
Burlington & North-West'n Ry. 3 g. 38 m. 3 lo. 97 c.
Burlington & Western R. R. 3 g. 15 m. 38 c.
E. S. Edger, *Supt.* .... .Burlington, Ia.
Burlington & Ohio River R. R. 4-8½ g.
R. Tanner, *Pur. Agt.*......... ......Chicago, Ill.

C

California Northern R. R. 4-8½ g. 26 m. 2 lo. 17 c.
Andrew J. Binney, *Gen. Man.*..Marysville, Cal.
California Southern R. R. 4-8½ g. 127 m. 13 lo. 301 c.
J. N. Victor, *Supt.*..........National City, Cal.
J. M. Keith, *M. M.*............National City, Cal.
Camden & Atlantic R. R. (*See Penna. R. R.; (2) Div.*)
Canada Southern Ry. (*See Mich. Cen.; (2) Div.*)
Canada Atlantic Ry. 4-8½ g. 135 m.
D. C. Linsley, *Man.*...... ... .Ottawa, Ont.
M. Donaldson, *M. M.* .... Ottawa, Ont.
Canadian Pacific Ry. 4-8½ g. 1,742 m. 118 l. 2,726 c.
W. C. Van Horne, *Gen. Man.*....Montreal, Can.
Francis R. F. Brown, *Mech. Supt.* Montreal, Can.
T. G. Shaughnessy, *Asst. G. M.*, Montreal, Can.
Alex. C. Henry, *Pur. Agt.*..... .Montreal, Can.
Q. Div.: A. Davis, *Gen. Supt.*..... Montreal, Can.
W. Div.: J. M. Egan, *Gen. Supt.*..Winnipeg, Man.
Ontario Div.: W. White, *Gen. Supt.* Montreal, Can.
Cape F'r & Yadkin Val. R. R. 4-8½ g. 112 m. 7 lo. 60 c.
W. M. S. Dunn, *Gen. Supt.*...Fayetteville, N. C.
Isaac W. Clark, *M. M. & C. B.*..Fayetteville, N. C.
Cape Girardeau Southwestern Ry.
4-8½ g. 52 m. 3 lo. 51 cars.
Louis Houck, *Gen. Man.*..Cape Girardeau, Mo.
W. A. Penney, *Supt.* .....Cape Girardeau, Mo.
D. L. Meyers, *Pur. Agt.*....Cape Girardeau, Mo.
Fred Glover, *M. M.*.........Cape Girardeau, Mo.
Carolina Central R. R. (*See Ral. & Aug.*)
Carillon & Grenville Ry. 5-6 g. 13 m.
R. W. Shepard, *Pres.*................Montreal, Can.
Carson & Colorado R. R. (*See Va. & Truckee*).
Catasauqua & Fogelsville. 4-8½ g. 25 m. 6 lo. 581 c.
C. W. Chapman, *Supt. & P. A.* Catasauqua, Pa.
J. Thomas, *M. M.* ....Hokendauqua, Pa.
Chas. J. Holbach, *M. C. B.*.... Catasauqua, Pa.
Catskill Mountain R. R. 3 g. 16 m. 2 lo. 26 cars.
Charles A. Beach, *Supt.* ....Catskill, N. Y.
Cazenovia, Canastota & De Ruyter. (*See U., I. & E.*)

Central and South-Western Railroads (Ga.).
5 g. 1,115 m. 145 lo. 2,008 cars.
W. G. Raoul, *Pres.*.......... ....Savannah, Ga.
Wm. Rogers, *Gen. Supt.*... ....Savannah, Ga.
C. H. Carson, *Pur. Agt.* ....Savannah, Ga.
Cen. Div.: D. D. Arden, *M. M.*......Savannah, Ga.
T. F. Warwick, *M. M.* ... .Augusta, Ga.
F. Devine, *M. C. B.* ....Savannah, Ga.
So.-West'n Div.: T. D. Kline, *Supt.*.....Macon, Ga.
D. M. Gugel, *M. M.* ....Macon, Ga.
S. A. Charpiot, *M. C. B.*.......... Macon, Ga.
Central R. R. of N. J. (*See Phil. & Read.; N. J. Cen. Div.*)
Central American & Pacific Ry. 3 g. 67 m. 1 lo. 11 c.
W. C. Fitzsimmons, *Gen. Supt.*..Escuintla, Guat.
Central Branch Union Pac. (*See Mo. Pac.; (3) Div.*)
Central Iowa Ry. 4-8½ g. 412 m. 50 lo. 2,313 cars.
E. L. Dudley, *Supt.*...........Marshalltown, Ia.
J. G. Johnston, *Asst. Supt.*....Marshalltown, Ia.
D. D. Phelps, *Asst. Supt.*.........Monmouth, Ill.
C. H. Ackert, *Pur. Agt.*...........Marshalltown, Ia.
John Player, *M. M. & M. C. B.* Marshalltown, Ia.
Central Ontario Ry. 4-8½ g. 33 m. 4 lo. 66 cars.
J. B. McMullen, *Gen. Man.*.........Picton, Ont.
James Falconar, *M. M.*..............Trenton, Ont.
Central Pac. R. R. 4-8½ g. 4,303 m. 382 lo. 11,260 c.
A. N. Towne, *Gen. Man.* ....San Francisco, Cal.
J. A. Fillmore, *Gen. Supt.*...San Francisco, Cal.
R. H. Pratt, *A. G. Supt.*....San Francisco, Cal.
J. R. Watson, *Gen. Pur. Agt.*..Sacramento, Cal.
A. J. Stevens, *Gen. M. M.*.....Sacramento, Cal.
W. McKenzie, *Asst. G. M. M.*..Sacramento, Cal.
Benj. Welch, *Gen. M. C. B.*....Sacramento, Cal.
G. J. Turner, *Asst. G. M. C. B.* Sacramento, Cal.
Western; Visalia & Tulare Divs. and Northern Ry.
A. D. Wilder, *Supt.* ....W. Oakland, Cal.
G. D. Welch, *M. M.* (W. Div.) W. Oakland, Cal.
W. B. Ludlow, *M. C. B.* (W. Div.) do.
S. Johnson, *M. M.* (T. Div.).......Tulare, Cal.
J. B. Wright, *Supt.* ....Sacramento, Cal.
M. W. Cooley, *M. M.* (*S. Div.*) . Rocklin, Cal.
Truckee Div.: J. H. Whited, *Supt.* Wadsworth, Nev.
Geo. Gregg, *M. M.*.... .... Wadsworth, Nev.
Wm. McPherson, *F. Car Sh.*..Wadsworth, Nev.
Humb't Div.: G. W. Coddington, *Supt.* Carlin, Nev.
W. F. Smith, *M. M.*..............Carlin, Nev.
J. C. Doughty, *For. Car Sh.*... ...Carlin, Nev.
Salt Lake Div.: A. G. Fell, *Supt.*.....Ogden, Utah.
James Lamb, *M. M.*.. .. ..Terrace, Utah.
A. Sherburne, *For. Car Sh.*.. ...Ogden, Utah.
St. & Cop. R. R.: R. L. Myrick, *Supt.*..Stockton, Cal.
Los Angeles; and Yuma Divs. (So. Pac.):
E. E. Hewitt, *Asst. Supt.*....Los Angeles, Cal.
James Velsir, *M. M.*.. .....Los Angeles, Cal.
T. T. Gilleland, *For. Car Sh.* Los Angeles, Cal.
Arizona Divs (So. Pac.):
J. A. Muir, *Asst. Supt.*.... ....Tucson, Ariz.
W. F. Smith, *M. M.*.. .. ..Tucson, Ariz.
Rio Grande (S. Pac.) & El Paso (G. H. & S. A.) Divs.:
C. B. Seymour, *Supt.*...........El Paso, Texas.
J. L. Bonner, *M. M.* ....El Paso, Texas.
H. C. Standish, *For. Sh.* ....El Paso, Texas.
Central Texas & N'w'n R. R. (*See Hous. & Tex. Cen.*)
Central Vermont R. R. 4-8½ g. 864 m. 185 lo. 2,789 c.
J. W. Hobart, *Gen. Man.*.........St. Albans, Vt.
J. M. Foss, *Gen. Supt.* ....St. Albans, Vt.
W. J. Robertson, *Supt. M. P.*....St. Albans, Vt.
No. Div.: I. B. Futvoye, *Supt.*.....St. Johns, P. Q.
Rut. Div.: J. Burdett, *Supt.*.... .....Rutland, Vt.
N. L. Davis, *M. M. & C. B.*....... Rutland, Vt.
Brattleboro & Whitehall R. R., and
Brat. Div.: E. F. Brooks, *Supt.*...Brattleboro, Vt.
New London No'n R. R. 143 m. 22 lo. 303 c.
C. F. Spaulding, *Supt. & P. A.* New London, Ct.
I. N. Dow, *M. M.* ....New London, Ct.
S. O. Banks, *M. C. B.* . .. .. .New London, Ct.
Chagrin Falls & Southern R. R. 3 g. 6 m. 1 lo. 12 c.
W. Hutchings, *Gen. Man.*.....Chagrin Falls, O.
J. W. Williams, *Gen. Supt.*....Chagrin Falls, O.
Charleston & Savannah Ry. 5 g. 115 m. 15 lo. 200 c.
H. S. Haines, *Gen. Man.*......... Savannah, Ga.
C. S. Gadsden, *Gen. Supt.*......Charleston, S. C.
H. A. Ulmo, *M. M.* .... Savannah, Ga.
Charlotte, Columbia & Augusta R. R. (*See Rich. & D.*)
Chateaugay R. R. 3 g. 34 m. 8 lo. 380 cars.
A. L. Inman, *Gen. Man.*..... Plattsburg, N. Y.
J. M. Davies, *Supt.*......Lyon Mountain, N. Y.
M. L. French, *Asst. Supt.*.... Plattsburg, N. Y.
Chatham Ry. 4-8½ g. 9 m.
J. B. Snowball, *Man.* .... Chatham, N. B.
Chattaroi Ry. 4-8½ g. 51 miles 11 loco. 483 cars.
J. H. Northrop, *Gen. Man. & P. A.* Ashland, Ky.
J. R. Martin, *M. M.*......... ... Ashland, Ky.
Joseph P. Burleigh, *M. C. B.*..... .Ashland, Ky.
Cheraw & Chester R. R. (*See Rich. & Dan.; (2) Div.*)
Cheraw & Darlington R. R. (*See Wil. & Wel.*)
Cheraw & Salisbury R. R. (*See Wil. & Wel.*)
Cherokee R. R. (*See East & West.*)
Cherry Valley R. R. 4-8½ g. 6 m. 3 lo. 6 cars.
E. T. Herndon, *Supt.*...................Midland, Mo.
Chesapeake, Ohio & South-Western.
4-9 g. 398 m. 62 lo. 1,345 c.
Jas. L. Frazier, *Supt.*.... ....Louisville, Ky.
H. E. Huntington, *Pur. Agt.*.....Louisville, Ky.
J. A. Dew, *Mast. Trans.* .... Paducah, Ky.
R. H. Briggs, *Supt. M. P.*...........Paducah, Ky.
D. L. Weaver, *M. M.* ... ..Elizabethtown, Ky.
Jno. Fitzgerald, *M. M.*...............Paducah, Ky.
Chesapeake & Ohio Ry. 4-9 g. 642 m. 181 l. 5,611 c.
C. W. Smith, *Gen. Man.*........Richmond, Va.
D. A. Sweet, *Asst. to Gen. Man.* Richmond, Va.
A. S. Emmons, *Pur. Agt.*..... ..Richmond, Va.
T. L. Chapman, *Supt. M. P.*.. ...Richmond, Va.
Eastern Div.: A. H. Wood, *Supt.*..Richmond, Va.
J. N. King, *M. C. B.* ....Richmond, Va.
C. F. Thomas, *M. M.* ....Richmond, Va.
Hunt. Div.: E. H. Barnes, *Supt.* Hinton, W. Va.
W. T. Smith, *M. M.*....Huntington, W. Va.
H. C. Bassinger, *M. C. B.* Huntington, W. Va.
Lex. Div.: J. D. Yarrington, *Supt.*..Lexington, Ky.
W. T. Smith, *M. M.*......Huntington, W. Va.
Ky. Cent. Div. 4-9 g. 250 m. 27 l. 610 c.
H. E. Huntington, *Supt.*.. ...Covington, Ky.
S. R. Tuggle, *M. M.* .... Covington, Ky.
Cheshire R. R. 4-8½ g. 80 m. 31 lo. 531 cars.
R. Stewart, *Gen. Man.*......... ....Keene, N. H.
H. H. Stone, *Pur. Agt.*.............Keene, N. H.
F. A. Perry, *M. M.* ....Keene, N. H.
A. E. Howard, *M. C. B.*........... Keene, N. H.
Chester & Lenoir Ry. (*See Rich. & Dan.; (3) Div.*)
Chicago, Bur. & Kan. City Ry. (*See C. B. & Q.*)
Chicago, Burlington & Quincy R. R.
4-8½ g. 3,608 m. 545 lo. 21,012 cars.
H. B. Stone, *Gen. Man.*..... . ... Chicago, Ill.
(1) C., B. & Q., East of Mo. Riv.
J. D. Besler, *Gen. Supt.* .... Chicago, Ill.
Wm. Irving, *Gen. Pur. Agt.*.........Chicago, Ill.
G. W. Rhodes, *Supt. M. P.* ....Aurora, Ill.
Wm. Forsyth, *Mech. Eng.*.... ....Aurora, Ill.
Ill. Divs.: C. F. Resseguie, *Supt.*....Galesburg, Ill.
Chi. Div., Geo. Alexander, *Supt.*... .Aurora, Ill.
L. E. Johnson, *M. M.*...................Aurora, Ill.
Galesburg Div.: F. C. Rice, *Supt.* Galesburg, Ill.
Robert Colville, *M. M.*.......... Galesburg, Ill.
St. L. Div.: W. C. Brown, *Supt.* Beardstown, Ill.
A. Forsyth, *M. M.*............Beardstown, Ill.
Ia. & Mo. Divs.: W. F. Merrill, *Supt.* Burlington, Ia.
East. Div.: O. E. Stewart, *Supt.*..Burlington, Ia.
Joel West, *M. M.*..................Burlington, Ia.
Mid. Div.: J. B. Maxon, *Supt.*.......Ottumwa, Ia.
West'n Div.: J. H. Duggin, *Supt.*....Creston, Ia.
C. W. Eckerson, *M. M.*...............Creston, Ia.
Chi., B. & Kan. C'y and St. L., Keo. & No.-W'n Rys.
Robt. Law, *Gen. Supt.*..............Keokuk, Ia.
W. H. Bartlett, *M. M.*...............Burlington, Ia.
(2) C. B. & Q., West of Mo. Riv.
G. W. Holdrege, *Gen. Man.*......Omaha, Neb.
C. M. Wead, *Supply Agt.*.... .....Omaha, Neb.
D. Hawksworth, *M. M.*........Plattsmouth, Neb.
C. M. Wead, *Storek'pr.*......Plattsmouth, Neb.
Bur. & Mo. Riv. & Neb. Ry. Divs.:
T. E. Calvert, *Gen. Supt.* ....Lincoln, Neb.
D. E. Thompson, *Supt.*..... .Lincoln, Neb.
E. Bignell, *M. M.* ....Lincoln, Neb.
R. V. Div.: A. Campbell, *Supt.*......McCook, Neb.
A. & N. Div.: J. McConniff, *Supt.*...Lincoln, Neb.
Chicago, Fairchild & Eau Claire R. R.
4-8½ g. 22 m. 4 lo. 28 cars.
N. C. Foster, *Gen. Man.*........Fairchild, Wis.
C. I. Wickersham, *Pur. Agt.*.... ...Chicago, Ill.

Chicago, Iowa & Dakota Ry. 4-8½ g. 26 m.
John Porter, *Gen. Man.* .. ..Eldora, Ia.
Chicago, Milwaukee & St. Paul R. R.
4-8½ g. 5,201 m. 626 lo. 19,018 cars.
Roswell Miller, *Gen. Man.*....Milwaukee, Wis.
Jos. F. Tucker, *Asst. Gen. M.*..Milwaukee, Wis.
J. T. Clark, *Gen. Supt.*.........Milwaukee, Wis.
A. J. Earling, *Asst. Gen. Supt.* Milwaukee, Wis.
J. T. Crocker, *Pur. Agt.*........Milwaukee, Wis.
J. M. Lowry, *Gen. M. M.*.......Milwaukee, Wis.
E. Fairbairn, *M. M.* ... .Milwaukee, Wis.
John Bailie, *Supt. Car Dept.*...Milwaukee, Wis.
W. E. Kittridge, *M. C. B.* .....Milwaukee, Wis.
(1) C. & M. and C. & C. B. in Ill.:
G. O. Clinton, *Supt.*............ ....Chicago, Ill.
Ch. & C. B. in Ia.:
R. B. Campbell, *Supt.*............Marion, Wis.
La C. & Wis. Val. Divs.:
W. G. Collins, *Supt.* ....Milwaukee, Wis.
P. du C. & M. Pt. Divs.:
S. J. Collins, *Supt.*.............Milwaukee, Wis.
(2) C. H. Prior, *Asst. Gen. Supt.*..Minneapolis, Minn.
H. & D. Div.: W. M. Kellie, *Supt.* do.
J. O. Pattie, *M. M.*....... Minneapolis, Minn.
Ia. & Minn. Div.: E. H. Graves, *Supt.* do.
S. Minn. Div.: H. R. Williams, *Supt.* Lacrosse, Wis.
Riv. & Dub. Divs.: C. W. Case, *Supt.* Dubuque, Ia.
S. Charnley, *M. M.*...... .....Dubuque, Ia.
Ia. & Da. Div.: F. D. Underwood, *Supt.* Ma'n C'y, Ia.
S. Cy. & Da. Div.: W. J. Underwood, *Supt.* Sioux Cy, Ia.
F. H. Moulton, *M. M.*..... ......Yankton, Dak.
J. M. Horan, *For.*... ....Yankton, Dak.
(3) D. A. Olin, *Asst. Gen. Supt.*........Racine, Wis.
R. & S. W. Divs.: D. L. Bush, *Supt.*..Racine, Wis.
John Taylor, *M. M.* ....Racine, Wis.
(4) Northern Div.: L. B. Rock, *Supt.* Milwaukee, Wis.
Wm. E. Kittredge, *M. C. B.*..Milwaukee, Wis.
Chicago, Rock Island & Pac. Ry.
4-8½ g. 1,381 m. 309 lo. 8,367 cars.
R. R. Cable, *Pres. & Gen. Man.*....Chicago, Ill.
E. St. John, *Asst. Gen. Man.*......Chicago, Ill.
A. Kimball, *V. P. & Gen. Supt.*....Chicago, Ill.
H. F. Royce, *Asst. G. Supt.*.... ..Davenport, Ia.
F. A. Marsh, *Pur. Agt.*................Chicago, Ill.
T. B. Twombly, *Gen. M. M.*.. .....Chicago, Ill.
B. K. Verbryck, *Gen. M. C. B.*.......Chicago, Ill.
Ill. Div.: R. H. Chamberlin, *Supt.*.....Chicago, Ill.
R. Biester, *M. M.*................ ..Chicago, Ill.
Sam'l Pullman, *M. C. B.*.............Chicago, Ill.
Ia. Divs.: Jno. Given, *Supt.* ....Des Moines, Ia.
J. G. Crockett, *M. M.*.................Stuart, Ia.
Jas. E. Morrill, *M. M.*...........Davenport, Ia.
Chas. M. Leonard, *M. C. B.*......Davenport, Ia.
K. & Des. M. Div.: Jno. Given, *Supt.* Des Moines, Ia.
S. W. Wakefield, *M. M.*...........Keokuk, Ia.
Henry Kummer, *M. C. B.*..........Keokuk, Ia.
So.-Wn. Div.: G. F. Walker, *Supt.*....Trenton, Mo.
R. O. Carscadin, *M. M.*.............Trenton, Mo.
Chas. R. Best, *M. C. B.*........ ...Trenton, Mo.
Chicago, Saginaw & Canada R. R. (*See Det., L. & N.*)
Chicago, St. Louis & New Orleans R. R. (*See Ill. Cen.*)
Chicago, St. Louis & Pittsburgh R. R.
4-9 g. 635 m. 202 lo. 3,510 cars.
James McCrea, *Gen. Man.*..... .Pittsburgh, Pa.
John M. Miller, *Gen. Supt.* ..... Columbus, O.
Wm. Mullins, *Gen. Pur. Agt.*...Pittsburgh, Pa.
Edward B. Wall, *Supt. M. P.* ....Columbus, O.
1, 3 & 5 Divs.: J. J. Turner, *Supt.* Richmond, Ind.
Robert Curtis, *M. M.*..............Columbus, O.
J. L. Copeland, *G. F. Car Shops.* Columbus, O.
Wm. Swanston, *M. M.*......Indianapolis, Ind.
W. C. Arp, *Gen. For.*.......Indianapolis, Ind.
2 & 4 Divs.: Chas. Watts, *Supt.* Logansport, Ind.
W. W. Reynolds, *M. M.* .....Logansport, Ind.
Chas. H. Starr, *G. F. C. Shops.* Logansport, Ind.
Chicago, St. Louis & Wn. R. R. 4-8½ g. 152 m. 11 lo. 1,799 c.
F. E. Hinckley, *Gen. Man.*.........Chicago, Ill.
B. T. Lewis, *Pur. Agt.*...............Chicago, Ill.
A. H. Crocker, *Supt.*............. ..Streator, Ill.
J. N. Chilson, *M. C. B.*.............Streator, Ill.
Chicago, St. Paul, Minneapolis & Omaha Ry.
4-8½ g. 1,301 m. 181 lo. 5,459 cars.
J. M. Whitman, *Gen. Supt.*......St. Paul, Minn.
W. H. S. Wright, *Pur. Agt.*......St. Paul, Minn.
Matt. Ellis, *M. M.*... ....St. Paul, Minn.
J. J. Ellis, *Asst. M. M.*. . ...St. Paul, Minn.
H. L. Preston, *M. C. B.*...............Hudson, Wis.
Ea. & No. Div.: A. A. Hobart, *Supt.* St. Paul, Minn.
St. Paul and Sioux City Div.:
H. Spencer, *Supt.* ....St. James, Minn.
H. C. Anderson, *Asst. M. M.*....Sioux Cy, Ia.
Neb. Div.: Jas. McCabe, *Supt.*......Omaha, Neb.
Chicago & Alton R. R. 4-8½ g. 849 m. 213 lo. 6,168 c.
C. H. Chappell, *Gen. Man.*.........Chicago, Ill.
T. M. Bates, *Supt. of Trans.*...Bloomington, Ill.
A. V. Hartwell, *Pur. Agt.*.. ......Chicago, Ill.
Wm. Wilson, *Supt. of Mach.*...Bloomington, Ill.
Jos. Townsend, *G. For. Car Dept.* do.
Chi. Div.: A. M. Richards, *Supt.* Bloomington, Ill.
St. L. & K. C. Div.: S. D. Reeves, *Supt.* Roodhouse, Ill.
Wm. Hill, *M. M.*............ ... .Slater, Mo.
Chicago & Atlantic Ry. 4-8½ g. 269 m.
F. Broughton, *Gen. Man.* ....Chicago, Ill.
J. H. Parsons, *Supt.*.... ....Chicago, Ill.
C. J. Domville, *M. M.*.........Huntington, Ind.
Chi. & East'n Ill. 4-8½ g. 252 m. 56 lo. 3,870 cars.
O. S. Lyford, *Gen. Supt.*...............Chicago, Ill.
D. R. Patterson, *Pur. Agt.*... ......Chicago, Ill.
P. W. Drew, *M. Trans.*................Chicago, Ill.
Allen Cooke, *M. M.*.......................Danville, Ill.
Chicago & Grand Trunk Ry. (*See Grand Trunk.*)
Chicago & Great Southern Ry.
4-8½ g. 124 m. 4 lo. 122 c.
Geo. C. Kimball, *Rec.*..... ....Attica, Ind.
H. Crawford, Jr., *Supt.*............Chicago, Ill.
Chicago & Iowa R. R. 4-8½ g. 104 m. 18 lo. 237 cars.
T. J. Potter, *Gen. Man.*.... ....Chicago, Ill.
H. D. Judson, *Act. Gen. Supt.*.....Rochelle, Ill.
H. S. Bryan, *M. M.*........ . . Aurora, Ill.
Chicago & Northwestern Ry.
4-8½ g. 3,843 m. 672 lo. 21,054 cars.
Marvin Hughitt, *2d V. Prs. & G. M.* Chicago, Ill.
C. C. Wheeler, *Gen. Supt.*..........Chicago, Ill.
R. H. McCullough, *Ass't Gen. Supt.* Chicago, Ill.
R. W. Hamer, *Pur. Agt.* .... .Chicago, Ill.
Geo. W. Tilton, *Supt. M. P. & M.*; and
W. A. Scott, *A. Supt. M. P. & M.*..Chicago, Ill.
Wis. Div.: Ed. J. Cuyler, *Supt.*......Chicago, Ill.
Gal. Div.: Chas. Murray, *Supt.*....... Chicago, Ill.
Pen'a Div.: W. F. Fitch, *Supt.*.....Escanaba, Mich.
J. Symons, *M. M.*........ ... Escanaba, Mich.
Mad. Div.: C. A. Swineford, *Supt.*..Baraboo, Wis.
H. D. Page, *M. M.*...............Baraboo, Wis.
Minn. & Dak. Divs.: S. Sanborn, *Asst. Gen. Supt.*
Wis., St. P. & Dak. Div.:
Wm. Smith, *M. M.*.... ....Winona, Minn.
Dak. Cen. Ry.: J. S. Oliver, *Supt.*....Huron, Dak.
Ia. Div.: H. G. Burt, *Supt.*... ......Boone, Ia.
Robt. Quayle, *Act. M. M.*........ Clinton, Ia.
No. Ia. Div.: M. Hopkins, *Supt.*...Eagle Grove, Ia.
Win. & St. P. Div.:
W. P. Cosgrave, *Supt.*........Winona, Minn.
Wm. Smith, *M. M.*............Winona, Minn.
Chicago & West Michigan:
4-8½ g. 409 m. 47 lo. 1,629 cars.
J. B. Mulliken, *V. P. & G. Man.* Muskegon, Mich.
J. K. V. Agnew, *Gen. Supt.* Grand Rapids, Mich.
Allen Bourne, *Pur. Agt.*...............Detroit, Mich.
G. C. Watrous, *S. M. P. & R. S.* Muskegon, Mich.
Chicago & West'n Ind. R. R. 4-8½ g. 50 m. 12 lo. 150 c.
James D. Carson, *Gen. Man.*...... Chicago, Ill.
R. W. Johnson, *M. M.*.................Chicago, Ill.
Cincinnati, Columbus & Hocking Val. Ry.
4-9 g. 25 m. 2 lo. 77 cars.
D. P. Hyatt, *Gen. Man.*.. ....Dayton, O.
Cin., Georgetown & Portsmouth. 3 g. 35 m. 3 lo. 45 c.
M. Simmons, *Supt.*.................Cincinnati, O.
F. Enler, *M. M.* . ...Cincinnati, O.
Cincinnati & Green River Ry. 5 g. 17 m. 2 lo. 50 c.
G. B. Harper, *Supt.*......... ... Yosemite, Ky.
F. S. Biggs, *M. M.* ....Yosemite, Ky.
Cin., Hamilton & Dayton R. R. 4-9 g. 352 m. 92 l. 2,932 c.
W. F. Stark, *Asst. Supt.*... ....Cincinnati, O.
John Black, *Gen. M. M.*. .... Lima, O.
W. H. H. Allison, *M. C. B.*........Cincinnati, O.
Cincinnati, Hamilton & Indianapolis R. R.
4-8½ g. 98 m.
C. J. Hepburn, *Supt.* ....Cincinnati, O.
Day. & Mich. Div.:

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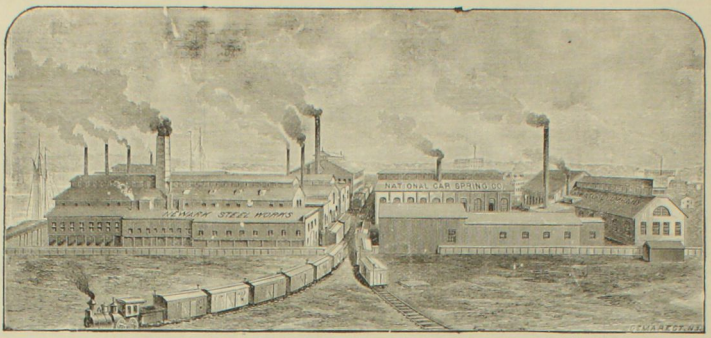

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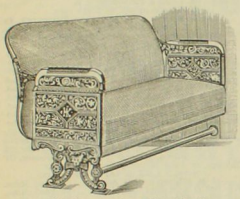
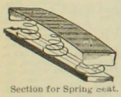
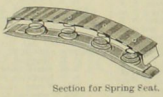


Rattan Spring-Edge Seat.



Section for Spring Seat.



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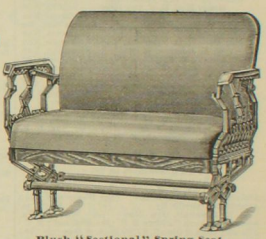

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The signals are all given audibly on the Locomotive by the opening of a normally closed circuit, are thoroughly automatic in their operation, and signal danger when out of order from accident or malevolence. The signal, once given, sounds continuously until stopped by the engineer. **No Batteries are used on the Locomotive, nor on the line, nor any mechanism requiring to be wound or adjusted.** These signals give absolute safety under all conditions where carelessness and inattention to visual signals result in accident. Examinations solicited and proofs of actual working given. Descriptive pamphlets sent.

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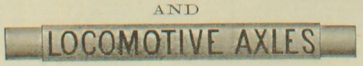

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Geo. Tozzer, *Pur. Agt.*..........Cincinnati, O.
J. S. Patterson, *M. of Mach. & M. C. B.* Cincinnati, O
Cincinnati, New Orleans & Texas Pacific Ry. Co. 5 g. 846 m. 123 lo. 3,464 cars.
John C. Gault, *Gen. Man*........Cincinnati, O
Richard Carroll, *Gen. Supt*.......Cincinnati, O.
R. W. Healey, *Gen. Pur. Agt*.....Cincinnati, O.
James Meehan, *S. M. P. & M*... Cincinnati, O.
Cin. So. Div.: W. W. Wells, *Supt*..Somerset, Ky.
J. L. Tomlinson, *Asst. S. M. P.*.. Ludlow, Ky
John Richardson, *M. C. B*.... .Cincinnati, O.
A. Thomson, *M. M*... ...Chattanooga, Tenn.
Ala. Gr. S'n Div.: D. McLaren, *Supt.*, and George Manuell, *M. M*...Chattanooga, Tenn
J. M. Kelly, *M. C. B*.....Chattanooga, Tenn.
V. & M. Div.: E. F. Raworth, *Supt.*, and *M. M* ... Vicksburg, Miss.
V.S. & P. Div.: M. S. Belknap, *Supt.* Monroe, La.
W. Bell Smith, *M. M. & C. B*.....Monroe, La.
New Orleans & North-Eastern R. R.
Edmund L. Tyler, *Supt* ....New Orleans, La.
I. W. Fowle, *M. M* ....Meridan, Miss.
Cincinnati Lebanon & Northern Ry.
Geo Hafer, *Pres*.................Cincinnati, O.
Cincinnati, Richmond & Chicago R. R. 4-9 g. 37 m.
C. J. Hepburn, *Supt*..............Cincinnati, O.
Cincinnati, Selma & Mobile R.R. 5 g. 71 m. 6 lo. 148 c.
A. McCollister, *Supt*................Selma, Ala.
H. L. Wright, *Pur. Agt*............Selma, Ala.
J. M. Levis, *M. M*..................Marion, Ala.
Cincinnati, Van Wert & Michigan R. R. 4-9 g. 94 m. 8 lo. 168 cars.
J. M. C. Marble, *Gen. Man*......Van Wert, O
H. H. Garr, *Supt. M. & E*.......Van Wert, O.
Cin., Wabash & Mich. Ry. 4-8½ g. 165 m. 1[illegible] lo. 402 c.
Norman Beckley, *Gen. Man. & P. A.* Elkhart, Ind.
O. W. Lamport, *Supt*............Wabash, Ind
S. B Tinker, *M. M. & M. C. B* ..Wabash, Ind
Cin., Wash. & Balt. 4-8½ g. 312 m. 65 lo. 1,889 cars
Jas. H. Stewart, *Gen. Man*.......Cincinnati, O.
Edw. Evans, *M. M* ....Chillicothe, O.
T. G. Duncan, *Supt. Car Dept*.......Zaleski, O.
Cincinnati, Wheeling & New York R.R. 4-8½ g. 13 m.
T. M. Atkinson, *Gen. Man*........Batesville, O.
Cincinnati & Eastern Ry. 3 g. 68 m. 6 lo. 133 cars. 4-8½ g. 50 m. 3 lo.
S. Woodward, *Rec* .... Cincinnati, O.
G. H. Wilber, *Gen. Sup. & Pur. Agt.* Cincinnati, O.
J C Homer, *M. M*..............Newtown, O.
P. W. Naughton, *M. M*. ....Batavia, O.
Cincinnati & South-Eastern Ry. 4-8½ g. 18 m.
John V. Patton, *Gen. Man*.... .Newport, Ky.
Clarksburg, Weston & Glenville R. R. 3 g. 26 m. 3 lo. 45 cars.
A. H. Kunst, *Pres. & Gen. Man.* Weston, W. Va.
Sam. A. Steel, *M. M*...........Weston, W. Va.
F. Dillie, *M. C. B*..............Nottingham, O.
Cleveland, Columbus, Cincinnati & Indianapolis & St Louis Rys. and Dayton & Union R. R. 4-8½ g. 785 m. 246 lo. 7,988 cars.
G. M. Beach, *Gen. Man* ....Cleveland, O.
J. L. Yale, *Pur. Agt*..............Cleveland, O.
W. F. Turreff, *Gen. M. M*.........Cleveland, O.
Col. & Cin. Div.: Robt. Blee, *Supt* .Cleveland, O.
E. Hudson, *M. M*.... ......Cleveland, O.
A. G. Steinbrenner, *G. For. Car Dept.* do.
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N. Mark, *G. For. Car Dept.* Brightwood, Ind.
Ind. & St L Ry.: Tho. Burrows, *Supt.* St. Louis, Mo.
Wm. Garstang, *M. M. & C. B.* Brightwood, Ind.
Day. & Un. Rd.: J. H. Barrett, *Supt*...Dayton, O.
H. S. Gordon, *For. M. Shops* ......Dayton, O.
Clevel'd, Delphos & St. Louis R.R. 3 g. 56 m. 3 lo. 39 c.
I. H. Burgoon, *Gen. Man*..........Delphos, O.
B. F. Marshall, *M. M*..............Delphos, O.
Cleveland, Indiana & St. Louis R. R. 4-8½ g. 19 m. 2 lo. 20 cars.
J. A. Larned, *Rec. & Supt* ....Anderson, Ind.
Cleveland, Mt. Vernon & Delaware R. R. 4-9 g. 144 m. 24 lo. 886 c.
N. Monsarrat, *Gen Supt*..............Akron, O.
G. M. Taylor, *M. M. & C. B*.....Mt. Vernon, O
Cleve., Youngstown & Pitts. R. R. 3 g. 30 m. 3 lo 138 c.
D. T. Lumley, *Gen. Supt*. ....Alliance, O.
C. H. Dorman, *M. M. & M C. B*....Alliance, O.
Cleveland, Lorain & Wheeling Ry. 4-8½ g. 158 m. 31 lo. 1,878 cars.
Oscar Townsend, *Gen. Man* ......Cleveland, O.
Wm. Thornburg, *Supt*......... Lorain, O.
C H. Waburton, *M. M*..............Lorain, O.
A. Warburton, *Gen. For*.............Lorain, O.
Cleveland & Canton R. R. 3 g. 160 m. 26 lo. 1,036 cars.
Samuel Briggs, *Gen. Man*..... .Cleveland, O.
John Bean, *M. M*.....................Canton, O
Cleve. & Marietta R. R. (*See Wheel. & Lake Erie.*)
Cleveland & Pittsburgh. (*See Penna. Co.; (4) Div.*)
Clifton & Port Hudson R. R. 4-8½ g. 22 m. 3 lo. 12 c.
John Bradley, *Supt*........New Orleans, La.
W. F. Lockwood, *M. M*............Clinton, La.
E. D. Anderson, *M. M*......... Vicksburg, Miss.
Clove Branch R. R. 4-8½ g. 8 m. 1 lo. 61 cars.
C. L. Kimball, *Supt*...... .Matteawan, N. Y.
W. G. Vanbuskirk, *M. M*...Dutchess Jc., N. Y.
Coburg, Peterborough & Marmora Ry. 5-6 g. 47 m. 5 lo. 255 cars.
Jas. R. Barber, *Gen. Supt*... ....Cobourg, Ont.
Jas. Clark, *M. M*... ....Cobourg, Ont.
John Tinney, *M. C. B*..............Cobourg, Ont.
Colorado Central R. R. (*See Un. Pac.; (4) Div.*)
Columbia & Greenville R. R. (*See Rich. & D.; (3) Div.*)
Columbia & Puget Sound R.R. 3 g. 21 m. 7 lo. 114 c.
J. L. Howard, *Gen. Supt*.. San Francisco, Cal.
Columbus, Hocking Valley & Toledo Ry. 4-9 g. 324 m. 90 lo. 7 353 cars.
G. R Carr, *Gen. Supt*..............Columbus, O
W M. Greene, *Pur. Agt*..........Columbus, O.
Ira G. Hutchins, *M. M*.... .. ....Columbus, O.
J. M. Rockafield, *M. C. B*.... ... Columbus, O.
Tol. Div.: M. T. Seymour, *Supt*......Columbus, O.
Hock. V. Div.: M. P. L. Booth, *Supt.* Columbus, O.
Ohio Riv. Div.: C. D. Norris, *Supt*.......Logan, O.
Columbus & Eastern R. R. in progress
J. E. Redfield, *Pres*....... ...Columbus, Ohio.
Columbus & Maysville Ry. (*See Cin. & East.*)
Columbus & Rome R. R. 3 g. 33 m. 3 lo. 30 cars.
M. E. Gray, *Supt* ... . .Columbus, Ga.
Columbus & Western Ry. 5 g. 89 m. 6 lo. 53 cars
E. A. Flewellen, *Gen. Man*. ...Columbus, Ga.
R. A. Bridges, *M. M* ....Opelika, Ala.
Concord R. R. 4-8½ g. 141 m. 41 lo. 1,264 cars
H. E. Chamberlin, *Supt. & P. Agt.*. Concord, N.H.
J. T. Gordon, *M. M. & C. B*.. . Concord, N H
Concord & Claremont R. R. (*See Northern of N. H.*
Conn. Riv. and Ver. Val. R. Rs. 4-8½ g. 130 m. 42 lo. 554 c.
J. Mulligan, *Supt. & Pur. Agt.* Springfield, Mass.
W. H. Stearns, *M. M. & M. C. B.* Springfield, Mass.
Conn. & Passumpsic Rivers R. R. (*See Passumpsic*)
Cooperstown & Susquehanna Valley R. R. 4-8½ g. 16 m. 2 lo. 14 cars.
Andrew Shaw, *Pres* ....Cooperstown, N. Y.
A. Mumford, *M. M*.........Cooperstown, N. Y.
Corning, Cowanesque & Antrim Ry. (*See F. Br. Coal Co.*)
Cornwall R. R.. 4-8½ g. 12 m. 5 lo. 166 cars
J. M. Havard, *G. Supt. & M. M*....Lebanon, Pa.
Levi Blonch, *M. C. B* ....Lebanon, Pa.
Cornwall & Lebanon R. R. 4-9 g. 5 m.
J. C. Jennings, *Supt* ....Lebanon, Pa.
Coudersport & Port Allegheny R. R. 3 g. 17 m. 2 lo. 64 cars.
B. A. McClure, *Gen. Supt*.....Coudersport, Pa.
Credit Valley Ry. 4-8½ g. 184 m. 22 lo. 535 cars.
Wm. Whyte, *Gen. Supt*..... .....Toronto, Ont.
John Macnab, *Pur. Agt*..... ......Toronto, Can.
D. Preston, *Mech. Supt*....... ...Toronto, Can.
Crescent Springs Ry. 3 g. 12 m. 2 lo. 50 c.
David Joyce, *Gen. Man* ....Lyons, Wis
W. R. Bourm, *Asst. Gen. Man.* Shell Lake, Wis.
John Devereaux, *Gen. Supt*. Shell Lake, Wis.
C. I. Wickersham, *Pur. Agt*......Chicago, Ill.
Ira Wood, *Supt. M. P. & M*...Shell Lake, Wis.
John Blackburn, *M. C. B* .... Shell Lake, Wis.
Crooked Creek R. R. 3 g. 9 m. 1 lo. 37 cars.
Walter C. Willson, *Gen. Man.* Webster City, Ia.
Geo. W. Post, *Pur. Agt*..............Lehigh, Ia.

Crown Point Iron Co.'s R. R. 3 g. 13 m. 3 lo. 135 c.
A. L. Inman, *Gen. Man*...... .Plattsburg, N. Y.
H. L. Reed, *Pur. Agt*.......Crown Point, N. Y.
Jas. McMann, *Supt* ....Crown Point, N. Y.
C. W. Sanders, *M. M*.... ... Crown Point, N. Y.
Cumberland Ry. 4-8½ g. 32 m. 1 lo. 64 c.
J. A. Killam, *Gen. Man*........Parsboro, N. S.
K. McKinnon, *M. M* ....Parsboro, N. S.
Cumberland Valley R. R. 4-9 g. 127 m. 25 lo. 474 cars.
J. F. Boyd, *Supt*...... .....Chambersburg, Pa.
A. S. Hull, *M. M*...... .. ...Chambersburg, Pa.
C. Wicke, *M. C. B*...... ...Chambersburg, Pa.
Cumberland & Maurice River R. R. 4-8½ g. 20 m
L. H. Dowdney, *Supt*.........Port Norris, N. J.
Cumberland & Penn. R. R. 4-8½ g. 55 m. 28 lo. 625 c.
P. L. Burwell, *Gen Supt & P. A.* Cumberland, Md.
N. W. Howson, *Mast. of Mach.* Mt. Savage, Md.
Nathan Binix, *M. C. B* ....Mt. Savage, Md.

D

Danville & New River R. R. 3 g. 43 m. 2 lo 30 c.
W. T. Sutherlin, *Gen. Man*........Danville, Va.
W. T. Whittaker, *M. M*.............Danville, Va.
Danbury & Norwalk R. R. 4-8½ g. 36 m. 7 lo. 112 c.
C. M. Crawford, *G. Supt. & P. A.* S. Norwalk, Ct.
W. H. Wilkinson, *M. M. & C. B.* Danbury, Conn.
Danville, Mocksville & So.-Wn. R. R. 3 g. 28 m.
H. M. Shivler, *Supt*...........Leakesville, N. C.
Danville, Olney & O. R. R.R. 4-8½ g. 78 m. 3 lo. 34 c.
C. E. Henderson, *Rec. & Man*.........Olney, Ill.
W. A. Bell, *M. M. & C. B*.. .... ..Kansas, Ill
Dayton & Toledo R. R. 3 g. 96 m.
C. E. Henderson, *Gen. Man*...... ..Dayton, O
J. E. Gimperling, *Supt* ... .Dayton, O.
Dayton & Union R. R. (*See Clev., Col., Cin. & Ind.*)
Dayton & Michigan R. R. (*See Cin., Ham. & Day.*)
Dayton & Ironton R. R.
C. E. Henderson, *Gen. Man* Indianapolis, Ind.
H. C. Norton, *Pur. Agt*.. .Indianapolis, Ind.
E. Heisrodt, *Supt. Mach* ....Dayton, O.
Del. Lackawanna & W. and N. Y. Lack. & W. R. Rs. 4-8½ g. 930 m. 436 lo. 31,989 cars.
Wm. F. Halstead, *Gen. Supt*.. ...Scranton, Pa.
G. W. B. Cushing, *Pur. Agt*. . New York, N. Y
Walter Dawson, *Mast. of Mach*...Scranton, Pa.
Robt. McKenna *M. C. B* . .Scranton, Pa.
Bloomsb'g Div.: C. Graham, *M. M.*.Kingston, Pa.
Utica Div.: A. C. Salisbury, *Supt*....Utica, N. Y.
Thos. Thatcher, *M. M* ....Utica, N. Y.
Morris & Essex Div.: Sussex; P. & D. and C. R. Rs.
A. Reasoner, *Supt*.... ....Hoboken, N. J.
W. H. Lewis, *M. M*.......... Kingsland, N. J.
J. W. Baker, *Mast. Car Rep*. ....Dover, N. J
Oswego & Syracuse Div.:
W. K. Niver, *Supt*...............Oswego, N. Y.
Jas. Buchanan, *M. M*. . Syracuse, N. Y.
Syracuse, Binghamton & New York R. R. 4-8½ g. 81 m. 20 lo. 598 cars.
W. K. Niver, *Gen. Supt* .. ...Syracuse, N. Y.
Jas. Buchanan, *M. M*.............Syracuse, N. Y.
Cayuga Div.: *Supt* Ithaca, N.Y.
Buffalo Div.: T. B. Griffith, *M. M*..Buffalo, N. Y
Delaware, Maryland & Virginia R. R. 4-8½ g. 101 m. 7 lo. 145 cars.
Tho. Groom, *Supt* ....Lewes, Del.
Geo. Messick, *M. M*...............Lewes, Del.
W. H. Virden, *M. C. B* ....Lewes, Del.
Delaware River R. R. 4-8½ g. 20 m. 3 lo. 8 cars.
E. H. Green, *Supt*.........Pedricktown, N. J.
Delaware & Hudson Canal Co. 4-3 and 4-8½ g. 634 m. 180 lo. 10,799 cars.
H. G. Young, *Gen. Man*.... Honesdale, Pa.
Theo. Voorhees, *Asst. Gen. Man* Honesdale, Pa.
J. White Sprong, *Pur. Agt*.......Albany, N. Y.
R. C. Blackall, *Supt. of Mach*.... .Albany N. Y
Susq. Div.: C. D. Hammond, *Supt.* Albany, N. Y..
Tho. Howard, *M. M*.............Oneonta, N. Y.
J. R. Skinner, *M. C. B*. .....Oneonta, N. Y.
Sar. & Ch. Divs.: *Supt*...Troy, N. Y.
J. L. Corey, *M. M*... .... . Green Island, N. Y.
Chr. Körner, *M. C. B*.. .. Green Island, N. Y
Pa. Div.: R. Manville, *Supt & Pur Agt*. and S. H. Dotterer, *M. M*.... ...Carbondale, Pa.
T. Orchard, *M. C. B*......... Carbondale, Pa.
Denver Circle R. R. 3 g. 12 m. 7 lo. 15 cars
Theo. C. Henry, *Gen. Man*.........Denver, Col
W. R. Sprague, *Gen. Supt*.........Denver, Col.
Denver, Utah & Pacific R. R. 3 g. 34 m. 4 lo. 171 c
L. M. Fouts, *Supt*...... ....Denver, Col.
Denver & New Orleans. 4-8½ g. 140 m 11 lo. 400 c.
C. W. Fisher, *Gen. Man*............Denver, Col.
Chas. Wheeler, *Pur. Agt*.... .....Denver, Col.
J. H. Kirk, *M. M. & M. C. B*. ....Denver, Col.
Denver & Rio Grande Ry. 3 g. 1,317 m. 222 lo. 5,932 c.
W. S. Jackson, *Rec.*..................Denver, Col.
C. M. Hobbs, *Pur. Agt* ... .Denver, Col.
N. W. Sample, *Supt. M. P. & M* ...Denver, Col.
(1) Col & N. M. Div.: R. E. Ricker, *G. S.* Denver, Col
1st Div.: W. W. Borst, *Supt*.......S. Pueblo, Col.
2d Div.: Cole Lydon, *Supt*..... ... Alamosa, Col.
3d Div.: G. W. Cook, *Supt*.........Leadville, Col.
4th Div.: R. M. Ridgway, *Supt*.......Salida, Col.
Denver, Rio Grande & Western Ry. 3 g. 369 m.
W. H. Bancroft, *Rec. & Gen. Supt.*, Salt Lake City, Utah.
A. L. Horner, *Ass't Supt.* Salt Lake City, Utah.
S. C. Smith, *M. M* ... ...Salt Lake City, Utah.
Des Moines, Osceola & Southern R. R. 3 g. 100 m. 7 lo. 253 cars
Jas. Donahue, *Supt*..............Des Moines, Ia.
Wm. Persing, *M. M*... ....Osceola, Ia.
Elias Tonet, *M. C. B*..............Osceola, Ia.
Des Moines & Ft. Dodge. 4-8½ g. 144 m. 13 lo. 350 c.
C. N. Gilmore, *Supt*..............Des Moines, Ia.
John McGrayel, *M. M*......Grand Junction, Ia.
E. A. Avery, *M. C. B* ....Grand Junction, Ia.
Det., Bay City & Alpena R. R. 3-2 g. 48 m. 5 lo. 227 c.
Milo Eastman, *Supt* .... East Tawas, Mich.
Det., Lansing & No'n R. R. 4-8½ g. 222 m. 84 lo. 1027 c
John B. Mulliken, *Gen. Man*......Detroit, Mich.
Allan Bourn, *Pur. Agt*............Detroit, Mich.
Thos. M. Fish, *Gen. Supt*............Ionia, Mich.
G. C. Watrous, *S. M. P. & R. S* ...Ionia, Mich.
Det., Mack. & Marq. R. R. 4-8½ g. 152 m. 16 lo. 1,112 c.
Andrew Watson, *Gen. Supt*...Marquette, Mich.
W. J. Tench, *Pur. Agt*........Marquette, Mich.
John B. Wilson, *Mech. Supt*....Marquette, Mich.
Dorchester & Delaware R. R. (*See Penna. (4) Del. Div.*)
Dubuque & Dakota R. R. 4-8½ g. 64 m. 2 lo. 54 cars.
A. C. Goodrich, *Supt*..............Hampton, Ia.
W. S. Couch, *Pur. Agt*...... .... Dubuque, Ia.
Duck River Valley R. R. (*See Nash., Chat. & St. L.*)
Dunkirk, Allegheny Valley & Pittsburgh R. R. 4-8½ g. 91 m. 14 lo. 102 cars.
D. Thayer, *Gen. Supt*............Dunkirk, N. Y.
R. C. Moore, *Pur. Agt*...... .New York, N. Y.
J. C. Haggett *M. M. & C. B*.....Dunkirk, N. Y.

E

East Alabama Ry. 5 g. 22 m. 3 lo. 19 cars.
W. W. Barnes, *Supt*..............Opelika, Ala.
East Broad Top R. R. 3 g. 30 m. 7 lo. 260 cars.
A. W. Sims, *Supt* ....Orbisonia, Pa.
A. W. Greenwood, *M. M*.... ....Orbisonia, Pa.
East St Louis & Carondelet Ry. 4-9 g. 4 lo. 27 c.
Joseph Hill, *Gen. Supt*......East St. Louis, Ill.
East Tenn. & Western North Car. R. R. 3 g. 34 m. 3 lo. 73 cars.
Thomas E. Matson, *Supt* ..Elizabethton, Tenn.
East Tennessee, Virginia & Georgia R. R. 5 g. 1,453 m. 166 lo. 3,670 cars.
Henry Fink, *Rec* .... Knoxville, Tenn
C. H. Hudson, *Gen. Man*......Knoxville, Tenn.
J. E. Wilcox, *Pur. Agt* ......Knoxville, Tenn
W. H. Thhomas, *Supt M. P.* Knoxville, Tenn.
East Tenn. Div. and No. Car. and Ohio Branches.
F. K. Huger, *Supt*............Knoxville, Tenn.
B. J. Sitton, *M. M* .... Knoxville, Tenn.
Jos. Armbruster, *M. C. B*....Knoxville, Tenn.
Alabama Div.: J. M. Bridges, *Supt*...Selma, Ala.
Simon Gay, *M. M* .. .. Selma, Ala.
W. W. Pierce, *M. C. B*. ....Selma, Ala.
Memphis & Charleston R. R. (Div.):
R. B. Pegram, Jr., *Supt*..... Memphis, Tenn
H. N. Burford, *M. M* ....Memphis, Tenn
Georgia Div.: J. W. Fry, *Supt*......Atlanta, Ga.
J. E. Mallory, *Ass't Supt*......Macon, Ga.
W. A. Walden, *M M* .. .. Atlanta, Ga.
J. H. Perkins, *M. C. B*. ....Atlanta, Ga.

East & West R. R. of Ala. 3 g. 110 m. 9 lo. 85 c.
T. J. Nicholl, *Manager* ....Cedartown, Ga.
C. F. West, *M. M. & C. B*... Cedartown, Ga
Eastern R. R. 4-8½ g. 283 m. 110 lo. 2,268 cars.
Payson Tucker, *Gen. Man*........Boston, Mass.
D. W. Sanborn, *Mast. of Trans*..Boston, Mass.
G. F. Hurd, *Pur. Agt*. .Boston, Mass.
Amos Pilsbury, *S. M. P. & M*. . E. Boston, Mass.
A. M. Waitt, *G. For. Car Dept*....Salem, Mass.
Con'y Div.: J. W. Sanborn, *Supt.*, Wolfboro J., N.H.
Eastern Kentucky R. R. 4-8½ g. 34 m. 5 lo. 160 c.
H. W. Bates, *Man. & Pur. Agt*... Riverton, Ky.
H. W. Crawford, *M. M*........Hunnewell, Ky.
Eastern (Maine) R. R. (*See Maine Central.*)
Eastern Shore R. R. 4-8½ g. 38 m. 3 lo. 9 c.
W. Thompson, *Supt*.... ....Princess Anne, Md.
F. Strattner, *M. M*.......... Princess Anne, Md.
Elmira, Cortland & Northern R. R. 4-8½ g
A. A. McLeod, *Gen. Man*..........Elmira, N. Y.
Edw. Mahler, *Pur. Agt*.......... Elmira, N.Y.
Thos Kearsley, *M. M. & M. C. B.* Cortland, N.Y.
Erie & Huron Ry. 4-8½ g. 40 m.
E. O. Bickford, *Gen Man* ....Toronto, Ont.
Erie & Pittsburg R. R. (*See Penna. Co.; (3) Div.*)
Etowah & Deaton's R. R. 3 g. 9 m.
D. M. Rogers, *Gen. Man*....... ...Etowah, Ga
Eureka Springs Ry. 4-8½ g. 19 m 1 lo. 9 cars.
Powell Clayton, *Gen. Man.* Eureka Springs, Ark.
Eureka & Palisade R. R. 3 g. 97 m. 7 lo. 125 cars.
B. Gilman, *Gen. Supt & Pur. Agt.*.Eureka, Nev.
J. M. Crawford, *M. M*..............Palisade, Nev.
A. S. Longley, *M C. B*....... ...Palisade, Nev.
European & North American R. R. (*See Maine Cen.*)
Evansville, Rockport & E'n Ry. 4-9 g. 71 m. 5 lo. 98 c
H. L. Shepard, *Supt*............Evansville, Ind.
Evansv. & Terre Haute. 4-8½ g. 169 m. 26 lo. 973 c.
D. J. Mackey, *Gen. Supt*...... Evansville, Ind.
John Torrance, *M. M*.... ......Evansville, Ind.

F

Fall Brook Coal Co. 4-8½ g. 250 m. 60 lo. 2,006 c.
Pine Creek Ry.; Corning, Cowanesque & Antrim; Cowansque Br.; Syracuse, Geneva & Corning; Geneva & Lyons; and New York & Penn Yan.
A. H. Gorton, *Gen. Supt* ....Corning, N. Y.
G. R. Brown, *Asst. Supt*.........Corning, N. Y.
W. H. Chaphe, *Pur. Agt*... ......Corning, N. Y.
Wm. A. Foster, *Supt. R. S. & Mach* Corning, N.Y
C. J. Butter, *M. C. B*...............Corning, N. Y.
Fitchburg R. R.. 4-8½ g. 152 m. 100 lo. 3,566 cars.
John Adams, *Gen. Supt*............Boston, Mass.
F. S. Pratt, *Pur. Agt* ....Boston, Mass.
Orlando Stewart, *Supt. M. P*......Boston, Mass.
J. W. Marden, *Supt. C. Dept.* Charlestown, Mass.
Flint & Pere Marq. 4-8½ g. 346 m. 78 lo. 2,664 cars
H. C. Potter, *Gen. Man*..... E. Saginaw, Mich.
D. Edwards, *Asst. Gen. Man.*.E. Saginaw, Mich
G. G. Cook, *Pur. Agt*..........E. Saginaw, Mich.
Sanford Keeler, *Gen. Supt*..E. Saginaw, Mich.
W. F. Potter, *Supt. (E. Div.)*..E. Saginaw, Mich
W. F. Potter, *Supt. (W. Div.)*. E. Saginaw, Mich.
T. J. Hatswell, *M. M* ..... .E. Saginaw, Mich.
H. M. Perry, *M. C. B* ....E. Saginaw, Mich.
Florida Ry. & Nav. Co. 5 g. 488 m. 31 lo. 397 c.
D. E. Maxwell, *Gen. Supt*.... Fernandina, Fla.
R. V. Dohoney, *M. M. & C. B* Fernandina, Fla.
Florida Southern Ry. 3 g. 159 m. 17 lo. 155 cars.
Sherman Conant, *Gen. Man* .. ...Palatka, Fla.
Jas. D. Hollister, *Supt. & P. Agt* .Palatka, Fla.
St. J. & L. Eustis Div.: 50 m.
W. J. Jarvis, *Supt* ....Ft. Mason, Fla.
W. B. Denham, *Asst. Supt*...Ft. Mason, Fla.
W. M. Rutherford, *M. M*.....Ft. Mason, Fla.
Fonda, Johnst'n & Gloversv. 4-8½ g. 26 m. 5 lo. 35 c.
Lawton Caten, *Supt*.. ......Gloversville, N. Y.
G. V. Putman, *M. M*....... Gloversville, N. Y.
Fond du Lac, Amboy & Peoria. 3 g. 30 m. 2 lo. 35 c.
Alonzo Kinyon, *Supt. & P. A.* Fond du Lac, Wis.
Fort Dodge & Fort Ridley R. R. (*See Minn. & St. L.*)
Franklin & Prov. & Hopkinton. 22 m.
E. T. Logee, *Supt* ....Milford, Mass.
Ft. Madison & No.-West'n Ry. 3 g. 45 m. 4 lo. 121 c.
S. B. Kenrick, *Rec. & Pur. Agt.* Ft. Madison, Ia
I. L. Lamb, *M. M. & C. B*.... Ft. Madison, Ia.
Ft. Wayne, Cin. & Louisv. 4-8½ g. 128 m. 10 lo. 250 c.
White Water R. R 4-8½ g. 65 m. 5 lo. 170 cars.
W. W. Worthington, *Gen. Supt*...Ft. Wayne, Ind.
T. H. Haberkorn, *M. M*.........Ft. Wayne, Ind.
Wm. Knight, *M. C. B*..........Ft. Wayne, Ind.
Ft. Worth & Denver City Ry. 4-8½ g. 114 m. 8 lo. 443 c.
C. L. Frost, *Gen. Supt* ......Fort Worth, Tex.
Freehold & New York Ry. 4-8½ g. 15 m. 4 lo. 40 c.
J. E. Ralph, *Supt. & Pur. Agt* Freehold, N. J.
M. C. Mooney, *M. M*..... .... Freehold, N. J.
C. H. Snedeker, *M. C. B*........ Freehold, N. J.
Fulton County N. G. Ry. 3 g. 61 m. 4 lo. 168 cars.
A. C. Atherton, *Gen. Supt. & P. Agt.* Lewiston, Ill.

G

Gainesville & Dahlonega R. R. 3 g. 15 m.
W. P. Price, *Pres*...............Dahlonega, Ga.
Gainesville, Jefferson & Southern R.R. (*See Cen. of Ga*)
Gal., Harrisburg & San Antonio Ry. (*See Cen. Pac.*)
Galveston, Houston & Hend. R.R. (*See Mo. Pac. (5) Div.*)
Galveston, Sabine & St. Louis Ry. 4-8½ g. 28 m. 2 lo. 33 cars
Brad. Barner, *Gen. Man*..... .Longview, Tex.
Chas. H. Jewell, *Gen. Supt*.....Longview, Tex.
Geneva, Ithaca & Sayre R. R. (*See Lehigh Val.*)
George's Creek & Cumberland R. R. 4-9 g. 25 m. 6 lo. 212 cars.
J. A. Millholland, *Gen. Man*.. Cumberland, Md.
Georgetown & Lane's R. R. 5 g. 36 m. 2 lo. 52 c.
G. W. Earle, *Gen. Supt*......Georgetown, S. C
Georgia R. R. 5 g. 307 m. 42 lo. 1,048 cars.
John W. Green, *Gen. Man*.........Augusta, Ga.
John S. Cook, *M. M*................Augusta, Ga
T. M. Preval, *M. C. B*... .....Augusta, Ga.
Georgia Pacific Ry. 5 g. 218 m.
I. Y. Sage, *Gen. Supt*........Birmingham, Ala.
S. H. Purcell, *Div. Supt*.......Greenville, Miss.
G. H. Barnum, *Div. Supt*... ..Columbus, Miss.
Gettysburg & Harrisburg R. R. 4-9 g. 21 m.
W. H. Woodward, *Supt.* Pine Grove Furnace, Pa.
G'd Rap., Newaygo & L. S. R. R. (*See Chic. & W. M.*)
Grand Rapids & Indiana. 4-9 g. 528 m. 56 lo. 2,083 c.
W. O. Hughart, *Gen. Man.* Grand Rapids, Mich.
W. R. Shelby, *Pur. Agt*....Grand Rapids, Mich.
S. D. Bradley, *M. M*..... Grand Rapids, Mich.
No'n Div.: J. M. Metheany, *Supt.* G'nd Rap., Mich.
So'n Div.: P. S. O'Rourke, *Supt.* Fort Wayne, Ind.
Grand Southern Ry. of New Brunswick. 4-8½ g. 82 m. 5 lo. 54 cars.
J. N. Greene, *Gen. Man*..... .St. George, N. B.
F. W. Holt, *Supt*............. St. George, N. B.
Thomas Logan, *M. M*.......St. George, N. B.
Grand Tower & Carbondale. 4-8½ g. 25 m. 6 lo. 357 c.
J. C. Simpson, *Supt*.......... Carbondale, Ill.
Hugh Smith, *M. M*.......... Murphysboro, Ill.
O. L. Garrison, *Pur. Agt* ...... St. Louis, Mo.
Grand Trunk Ry. 4-8½ g. 2,332 m. 660 lo. 16,330 c.
Joseph Hickson, *Gen. Man*.. ...Montreal, Can.
Wm. Wainright, *Asst. Gen. Man* Montreal, Can.
Jno. Taylor, *Gen. Storekeeper*...Montreal, Can.
Herbert Wallis, *Mech. Supt*.....Montreal, Can.
Wm. McWood, *Supt. Car Dept*..Montreal, Can.
J. Harkom, *Ass. Mech. Supt*..Richmond, P. Q.
A. H. Smith, *Ass. Mech. Supt*....Toronto, Ont.
R. Boaz, *Asst. Mech. Supt*.. ..Stratford, Ont.
F. L. Wanklyn, *Loco. Works*...Montreal, Can.
Gt. West'n Div.: Chas. Stiff, *Supt.* Hamilton, Ont.
E. Baines, *Store Kpr*........London, Ont.
C. K. Domville, *Mech. Supt*...Hamilton, Ont.
E. Mavor, *Asst. Mch. Supt*...Hamilton, Ont.
J. D. McIlwain, *Supt. Car Dept*. London, Ont.
Chi. & Gr. Trunk Ry. 4-8½ g. 339 m. 103 lo. 1,191 c.
W. J. Spicer, *Gen. Man*...... Detroit, Mich.
A. B. Atwater, *Supt*........Battle Creek, Mich.
J. F. Lorimer, *Storekeeper*.....Detroit, Mich.
H. Roberts, *Mech. Supt*.........Detroit, Mich.
Midland of Can. 4-8½ g. 471 m. 44 lo. 1,423 c.
W. B. Ferguson, *Supt*........Peterboro, Ont.
J. D. Barnet, *Mech. Supt*... Port Hope, Ont.
Det., Gr. H. & Mil. Ry. 4-8½ g. 189 m. 39 lo. 696 c.
W. J. Spicer, *Gen. Man*.............Detroit, Mich.
John S. Lorimer, *Storekeeper*....Detroit, Mich.
W. J. Morgan, *Supt*...............Detroit, Mich.
H. Roberts, *Mech. Supt*......Port Huron, Mich.

Green Bay, Winona & St Paul R. R. 4-8½ g. 250 m. 19 lo. 623 cars.
G. Campbell, *Gen. Man*.. & *P. A.* Green Bay, Wis.
A. Fenwick, *M. M*........... Ft. Howard, Wis.
Green Cove Spring & Melrose R.R. 3 g. 32 m. 1 lo. 11 c.
S. Ackley, *Pres*.... ....Philadelphia, Pa.
Greenwood, Laurens & Spart'g. 5 g. 4 lo.
J. N. Bass, *Supt* ....Augusta, Ga.
T. F. Warwick, *M. M. & M. C. B* .Augusta, Ga.
Greenwich & Johnsonville Ry. 4-8½ g. 15 m. 1 lo. 7 c.
J. H. Thompson, *Supt*.... ...Greenwich, N. Y.
Gulf, Col. & Santa Fé Ry. 4-8½ g. 536 m. 51 lo. 1,400 c.
Webster Snyder, *Gen. Man*..Galveston, Texas.
Jno. W. Thorne, *Pur. Agt*....Galveston, Texas.
W. H. Reilly, *M. M. & M. C. B*..Galveston, Texas.
H. J. Bearup, *Asst. M. M*......Galveston, Tex.
Gulf, W'n Texas & Pac. Ry. 4-8½ g. 68 m. 6 lo. 74 c.
M. D. Monserrate, *Supt. & Pur. Agt.* Cuero, Tex.
James Mooney *M. M*....... ...Cuero, Texas.

H

Hannibal & St. Jo. R. R. 4-8½ g. 292 m. 76 lo. 1,906 c.
J. F. Barnard, *Gen. Man* ..... .St. Joseph, Mo.
S. E. Crance, *Gen. Supt* ... .Hannibal, Mo.
Wm. Irving, *Pur. Agt*... .... Chicago, Ill
N. J Paradise, *Supt. M. M*... ....Hannibal, Mo.
G. M. Shryock, *M. C. B*..........Hannibal, Mo.
Hanover Branch R. R. 4-8½ g. 8 m. 2 lo. 18 cars
E. Y. Perry, *Supt*........South Hanover, Mass
Hanover Junction, Hanover & Gettysburg R. R. 4-8½ g. 74 m. 10 lo. 140 cars.
H. D. Scott, *Gen. Supt*.........Gettysburg, Pa.
John J. Bingley *M. M*..............Hanover, Pa.
Jas. Harthorn, *M. C. B*.......... ...Hanover, Pa.
Harrisburg & Potomac R. R. 4-8½ g. 41 m. 3 lo. 45 c.
R. H. Middleton, *Supt*......Boiling Springs, Pa.
Hartford & Conn. Val. R. R. 4-8½ g. 47 m. 9 lo. 196 c.
O. M. Shepard, *Supt*.... ..... New Haven, Ct.
John Henry, Jr., *Supt. M. P.* Hartford, Conn.
Hartford & Conn. W'n R.R. 4-8½ g. 110 m. 16 lo. 495 c.
Edw. McNeil, *Supt*........ .. . .Hartford, Ct.
Chas. H. Keane, *M. M* ....Hartford, Ct.
Hecla & Torch Lake R. R. 4-1 g. 5 m. 5 lo. 165 cars.
W. A. Childs, *Gen. Man*.........Calumet, Mich.
Herkimer, Newport & Poland Ry. 3-6 g. 17 m. 2 lo. 24 cars.
Albert Wilber, *Supt*...........Herkimer, N. Y.
Hobart & Manistee River R. R. 3 g. 9 m. 2 lo. 42 c.
H. W. Marsh, *Supt* ....Hobart, Mich.
Hot Springs R. R. 3 g. 25 m. 3 lo. 39 cars.
J. N. Conger, *Supt*... ....Hot Springs, Ark.
L. Finlay, *M. M*......................Malvern Ark.
Housatonic R. R. 4-8½ g. 126 m. 23 lo. 879 cars.
C. W. Wood, *Asst. Supt*.. ......Bridgeport, *Pur. Agt*..........Bridgeport, Ct.
N. Slingland, *M. M*..... ....Falls Village, Ct.
J. J. Ferris, *M. C. B*........ ...Falls Village, Ct.
Houston Belt Ry. 4-8½ and 3 gauge 16 miles.
S. L. Werden, *V. P. & Gen. Man.* Houston, Tex.
Houston, East & West Tex. Ry. 3 g. 150 m. 10 lo. 570 c.
Paul Bremond, *Pr. & Pur. Agt*..Houston, Tex.
E. L. Bremond, *Gen. Man*.......Houston, Tex.
Ed. Campbell, *M. M*...........Houston, Tex.
C. F. Schelewa, *M. C. B*. .....Houston, Texas.
Houston & Tex. Cen. Ry. 4-8½ g. 750 m. 78 lo. 2,526 c.
Geo. A. Quinlan, *Gen. Supt*......Houston, Tex.
A. H. Swanson, *Gen. Tr. Man*.....Houston, Tex.
L. C. Noble, *Gen. M. M*...........Houston, Tex.
James McGee, *M. C. B*.. ....Houston, Tex.
So. & Wn. Divs.: M. G. Howe, *Supt.* Houston, Tex.
No. & Mi. Divs.: G. A. Quinlan, *Supt.*, and C. H. Burns, *Asst. M. M*.....Corsicana, Tex.
No.-Wn. Div.: Donald Allen, *Supt*.... Waco, Tex.
Humeston & Shenandoah R. R. 4-8½ g. 113 m. 18 lo. 80 cars.
E. C. Murphy, *Gen. Man*...... ...Clarinda, Ia.
M. B. Snyder, *M. M* ....Shenandoah, Ia.
Huntingdon & Br. Top Mt. 4-8½ g. 65 m. 18 lo. 318 c.
Geo. F. Gage, *Gen. Man*. .. .Huntingdon, Pa.
Samuel B. Knight, *Pur. Agt*..Philadelphia, Pa.
William Barkla *M. M*...... .....Saxton Pa

I

Illinois Central R. R. 4-8½ g. 1,928 m. 334 lo. 8,565 c.
E. T. Jeffery, *Gen. Supt* .... .Chicago, Ill
O. Ott, *Pur. Agt*......................Chicago, Ill
Henry Schlacks, *Supt. of Mach*....Chicago, Ill.
W. B. Snow, *M. M. Car Works*.....Chicago, Ill
(1) Ill. & Ia. Divs.: C. A. Beck, *Supt*.....Chicago,
Chic. Div.: T. J. Hudson, *Supt* . ... Cairo, Ill
Wm. Renshaw, *M. M* ....Chicago, Ill.
Mid. Div.: H. L. Frisbie, *Supt*.. .... .Pontiac, Ill.
Spring. Div.: W. Wilkinson, *Supt.* Springfield, Ill.
Wm. Griffin, *M. M*. .. . . .Clinton, Ill.
No'n Div.: J. C. Jacobs, *Supt*..........Amboy, Ill.
J. B. Edams, *M. M*.............Amboy, Ill.
Ia. Div.: M. Gilleas, *Supt*........ ... Dubuque, Ia.
Thos. W. Place, *M. M*......... .Waterloo, Ia.
(2) So. Divs.: C. M. Sheafe, *Supt*....New Orleans, La.
La. Div.: J. M. Turner, *Supt.* McComb City, Miss.
W B. McKenna, *M. M*... McComb City, Miss.
Miss. Div.: J. G. Mann, *Supt*......Jackson, Tenn.
J. F. White, *M. M*.........Water Valley, Miss.
Illinois Midland Ry. 4-8½ g. 176 m. 12 lo. 611 cars.
D. H. Conklin, *Rec. & Gen. Man*......Decatur, Ill.
O. E. Grady, *Train Mast*............Decatur, Ill.
Frank Young, *For. Shops*..............Paris, Ill.
Illinois & St. Louis R. R. 4-8½ g. 19 m. 10 lo. 450 c
C. H. Sharman, *Gen. Supt. & P. A.* St. Louis, Mo
D. J. Timlin, *M. M*... ....Belleville, Ill.
Charles Rothe, *M. C. B*..... .. E. St. Louis, Ill
Indiana, Bloomington & Western Ry. 4-8½ g. 826 m. 108 lo. 4,018 cars.
C. E. Henderson, *Gen. Man*. Indianapolis, Ind.
I. H. Wilson, *Gen. Supt* .....Indianapolis, Ind.
H. C. Norton, *Pur. Agt*...... Indianapolis, Ind.
Jos. S. Porter, *Div. M. M*..........Sandusky, O.
E. Hiserodt, *Gen. M. M*.......Indianapolis, Ind.
M. Fogarty, *Div. M. M* ....Urbana, Ill.
W. B. Warren, *Div. M. M* ....Indianapolis, Ind.
Indiana, Illinois & Iowa R.R. 4-8½ g. 104 m. 5 lo. 83 c.
F. M. Drake, *Pres*.............. ...Kankakee, Ill.
T. P. Shonts, *Gen. Supt*..........Kankakee, Ill.
R. C. Ackley, *M. M*................Kankakee, Ill.
Indiana & Illinois Southern Ry. 3 g. 91 m. 3 lo. 69 c.
W. C. Lyon, *Gen. Man. & P. Agt.* Robinson, Ill.
J. S. Pickering, *M. M. & C. B*.. Effingham, Ill.
Indianapolis, Decatur & Springfield Ry.
Geo. Bender, *Supt* ... .Indianapolis, Ind. *M. M*.... ......Indianapolis, Ind.
Indianapolis & Evansville Ry. 4-8½ g. 54 m.
D. J. Mackey, *Supt* .. .. .Evansville, Ind.
Indianapolis & St. Louis R. R. (*See C., C., C. & I.*)
Indianapo. & Vincennes R.R. (*See Penna. Co.; (5) Div.*)
Intercolonial Ry. 4-8½ g. 873 m. 163 lo. 4,589 cars.
David Pottinger, *Chief Supt*.....Moncton, N. B.
T. V. Cook, *Gen. Storekeeper*...Moncton, N. B.
H. A. Whitney, *Mech Supt*......Moncton, N. B
Ewd. D. Shaffer, *M. C. B* ....Moncton, N. B.
M. & C. Dist.: J. E. Price, *Supt.* Campbellton, N. B.
Hal. & St. J. Div.: J. J. Wallace, *Supt*..Truro, N. B.
Q. & St. F. Div.: A. R. McDonald, *Supt.* Riv. du Lp, Q.
International Ry. 4-8½ g. 69 m. 7 lo. 12 cars.
D. E. McFee, *Supt*............Sherbrooke, P. Q.
J. Ruelle, *M. M*................Sherbrooke, P. Q.
W. Charest, *M. C. B* ....Sherbrooke, P. Q.
International & Gt. N'n R. R. (*See Mo. Pac.; (5) Div.*)
Iowa Falls & Sioux City R. R. (*See Ill. Cen.*)
Iron Mountain & Helena R. R. (*See Mo. Pac.; (4) Div.*)
Ithaca, Auburn & Western Ry. (*See Southern Cen.*)

J

Jacksonville So.-E'n R. R. 4-8½ g. 54 m. 5 lo. 69
E. S. Greenleaf, *Supt*..........Jacksonville, Ill.
Ira F. Petrie, *M. M*............Jacksonville, Ill.
Jacksonville, St. Augustine & Halifax River Ry. 3 g. 76 m. 3 lo. 27 cars
W. L. Crawford, *Gen. Man*..Jacksonville, Fla.
E. T. Silvius, *M. M* ....Jacksonville, Fla.
Jacksonv., Pensacola & Mob. (*See Fla. Cent. & W.*)
Jacksonville, Tampa & Key West Ry. 5 g. 56 m.
G. W. Bentley, *Gen. Man*. ..Jacksonville, Fla.
M. R. Moran, *Supt*..............Jacksonville, Fla.
F. B. Hurlbut, *M. C. B*.....Jacksonville, Fla.
Jamesville & Washington R. R. (*See Norfolk So'n.*)
Jeffersonv'l, Madison & Indpls. R. R. (*See (9) Pa. Co.*)
Jersey City & Albany R. R. 4-8½ g. 38 m.
J. W. McCulloh, *Manager* ...Jersey City, N. J.
Jersey City & Bergen R. R. 4-10 g. 21 m. 2 lo. 13 c.
T. M. Sayre, *Supt* ....Jersey City, N. J.
Jersey Shore, Pine Creek & Buff. Ry. (*See Phil. & R.*)
Junction & Breakwater R.R. (*See Del., Md. & Va.*)

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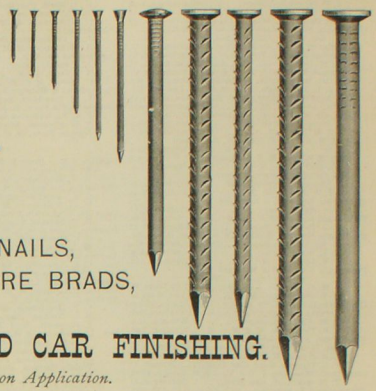

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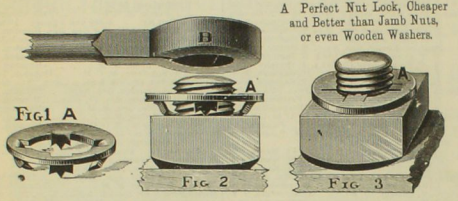

Fig. 1.—*A* represents nut lock detached. Fig. 2.—*A*, nut lock in position, ready to apply; *B*, the tool used in setting the lock—it is simply a bar of iron having a hole ¼ inch larger than the bolt—when placed as indicated one or two smart blows with a hammer on the tool force the lock flat, the teeth entering the metal of the bolt. Fig 3.—*A* represents the lock applied.

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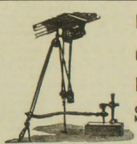

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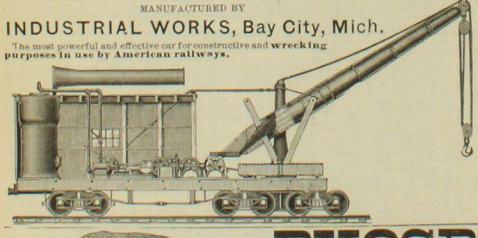

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K

Kaaterskill R. R. 3 g. 8 m.
J. H. Jones, *Supt*..........Rondout, N. Y.
Kansas Central R. R. (*See Union Pacific.*
Kansas City, Fort Scott & Gulf R. R.
4-8½ g. 389 m. 75 l. 2,037 c.
Geo. H. Nettleton, *Gen. Man*..Kansas City, Mo.
L. W. Towne, *Supt*..........Kansas City, Mo.
H. P. Jacques, *Pur. Agt*..... Kansas City, Mo.
J. S. McCrum, *M. M*..........Kansas City, Mo.
A. N. Montier, *M. C. B*.......Kansas City, Mo.
Kansas Cy, Lawrence & So. Kan. (*See At., Top. & S. F.*)
Kansas City, Springfield & Memphis R. R.
4-8½ g. 283 m. 10 lo. 456 cars.
George H. Nettleton, *Pres*....Kansas City, Mo.
L. W. Towne, *Supt*............Kansas City, Mo.
H. P. Jacques, *Pur. Agt*.......Kansas City, Mo.
J. S. McCrum, *M. M*...........Kansas City, Mo.
A. N. Montier, *M. C. B*.......Kansas City, Mo.
Kansas City, St. Joseph & Council Bluffs; and St. Jo. & Des Moines R. Rs. 4-8½ & 3 g. 368 m. 41 lo. 1,148 c.
J. F. Barnard, *Gen. Man*.........St. Joseph, Mo.
J. R. Hardy, *Supt*.........St. Joseph, Mo.
D. H. Winton, *Asst. Supt*......St. Joseph, Mo.
A. B. Barnard, *Asst. Supt*....Kansas City, Mo.
Wm. Irving, *Pur. Agt*............Chicago, Ill.
F. A. Chase, *M. M*..........St. Joseph, Mo.
Thos. Aylesbury, *S. For. Car. Dep.* St. Joseph, Mo.
Kansas City & Southern Ry. 4-8½ g. In progress.
Wm. Bailey, *Pres*............Kansas City, Mo.
Kansas Coal Belt R. R. 4-8½ g. In progress.
C. H. Malin, *Gen. Man*...........Girard, Kan.
F. A. Hill, *Supt*...............Girard, Kan.
Kansas & Gulf Short Line R. R. 33 m. 2 lo. 32 cars.
Gen. Man..........Tyler, Tex.
V. K. Stevenson, *Pur. Agt*.....New York, N. Y.
Kent Northern Ry. 4-8½ g. 27 m. 2 lo. 16 cars.
J. C. Brown, *Gen. Man*.....Richibucto, N. B.)
Kentucky Central R. R. (*See Ches. & Ohio*
Kentucky & South Atlantic Ry. 3 g. 23 m. 3 lo. 52 c.
Geo. B. Harper, *Supt. & P. A*..Mt. Sterling, Ky.
Geo. W. Lewis, *M. M*.........Mt. Sterling, Ky.
Keokuk & Des Moines R.R. (*See Chi., R. I. & Pac.*)
Kingston & Pembroke Ry. 4-8½ g. 104 m. 9 lo. 214 c.
B. W. Folger, *Supt*...........Kingston, Ont.
J. H. Taylor, *Pur. Agt*..........Kingston, Ont.
J. H. Taylor, *M. M*...........Kingston, Ont.
Knox & Lincoln R. R. 4-8½ g. 49 m. 6 lo. 119 cars.
C. A. Coombs, *Supt*..................Bath, Me.
Wm. A. Field, *M. M*................Bath, Me.
C. L. Turner, *M. C. B*..............Bath, Me.
Knoxville & Augusta R. R. 5 g. 16 m. 2 lo. 34 cars.
R. N. Hood, *Gen. Man. & P. Agt.* Knoxville, Tenn.
J. M. Hood, *Supt*...........Knoxville, Tenn.

L

Lackawanna & Pittsburgh R. R. 3 g. 97 m.
Geo. W. Chapman, *Rec*.........Angelica, N. Y.
J. F. O'Brien, *Gen. Man*........Angelica, N. Y.
Lake Champlain & Moriah R.R. 4-8½ g. 8 m. 8 lo. 222c.
E. B. Hedding, *Supt*.........Port Henry, N. Y.
Lake Erie & Western Ry. 4-8½ g. 388 m. 53 lo. 1,701 c.
J. H. Cheney, *Gen. Man*..... Bloomington, Ill.
D. S. Hill, *Gen. Supt*.........Bloomington, Ill.
T. H. Perry, *Pur. Agt*.........Bloomington, Ill.
H. L. Cooper, *Supt. of Equipment*....Lima, O.
Lake George & Muskegon River R. R.
4-8½ g. 20 m. 4 lo. 79 cars.
W. S. Gerrish, *Gen. Man*... Muskegon, Mich.
Lake Shore & Michigan So'n Ry.
4-8½ g. 1,340 m. 547 lo. 17,115 cars.
John Newell, *Pres*..........Cleveland, O.
P. P. Wright, *Gen. Supt*..........Cleveland, O.
L. G. Higgins, *Pur. Agt*..........Cleveland, O.
G. W. Stevens, *Supt. M. P*........Cleveland, O.
John Kirby, *Gen. M. C. B*........Cleveland, O.
East'n Div.: C. B. Couch, *Supt*.....Cleveland, O.
J. S. Graham, *M. M*............Buffalo, N. Y.
A. C. Robson, *M. C. B*........Buffalo, N. Y.
L. O. Gassett, *M. M*..........Cleveland, O.
J. Withycombe, *M. C. B*........Cleveland, O.
Frank. Div.: G. H. McIntire, *Supt.* Youngstown, O.
Toledo Div.: Thos. Flesher, Jr., *Supt.* Cleveland, O.
J. M. Sanborn, *M. M*..............Norwalk, O.
W. O. Smith, *M. C. B*.......... Norwalk, O.
Mich. Divs.: J. E. Curtis, *Supt*......... Toledo, O.
Det. Brs.: T. J. Charlesworth, *Supt.* Detroit, Mich.
Lansing, Ypsilanti & Ft. Wayne Branches.
W. H. Caniff, *Supt*..........Hillsdale, Mich.
Western Div.: A. G. Amsden, *Supt*...Chicago, Ill.
W. L. Gilmore, *M. M*...........Elkhart, Ind.
Frank O. Bray, *M. C. B*.........Adrian, Mich.
Gr. Rap. Br.: M. E. Wattles, *Supt.* Kalamazoo, Mich.
Lake Tahoe R. R. 3 g. 10 m. 3 lo. 49 cars.
D. L. Bliss, *Gen. Man*...........Carson, Nev.
John T. Rogers, *Gen. Supt*......Carson, Nev.
Tho. Morris, *M. M*.................Carson, Nev.
Leavenworth, Topeka & So. W'n Ry. (*See A. T. & S. F.*)
Lebanon Springs R. R. 4-8½ g. 58 m. 5 lo. 44 c.
W. C. Alstyne, *Gen. Man*... ....Albany, N. Y.
W. H. Hawkins, *Pur. Agt*.......Albany, N. Y.
Geo. Tefft, *M. M*.................Chatham, N. Y.
Lehigh Valley R. R. 4-8½ g. 495 m. 392 lo. 36,908 c.
H. S. Goodwin, *Gen. Supt*.......Bethlehem, Pa.
W. C. Alderson, *Pur. Agt*.....Philadelphia, Pa.
John I. Kinsey, *M. M*............So. Easton, Pa.
John S. Lentz, *M. C. B*.........Packerton, Pa.
N. J. Div.: Jas. Donnelly, *Supt.* Perth Amboy, N. J.
Coal Rds.: J. I. Blakeslee, *Supt.* Mauch Chunk, Pa.
D. Clark, *M. M*..................Hazleton, Pa.
John Campbell, *M. M*..............Delano, Pa.
B. M. Div.: A. G. Brodhead, *S.*.. Mauch Chunk, Pa.
P. Hofecker, *M. M*...............Weatherly, Pa.
Wy. Div.: A. Mitchell, *S. & M. M.* Wilkesbarre, Pa.
Pa. & N. Y.: and Geneva, Ithaca & Sayre R. Rs.
Wm. Stevenson, *Gen. Supt*..........Sayre, Pa.
J. N. Weaver, *M. M*.................Sayre, Pa.
Jno. S. Lentz, *M. C. B*...........Packerton, Pa.
Lehigh & Hudson River Ry. 4-8½ g. 63 m. 8 lo. 350 c.
Grinnell Burt, *Gen Man*........Warwick, N. Y.
N. L. Furman, *Supt*...........Warwick, N. Y.
John Sayre, *Pur. Agt*..........Warwick, N. Y.
S. Mills, *M. M*....................Warwick, N. Y.
Lehigh & Lackawanna and Lehigh & Susquehanna R. Rs. (*See Phil. & Read.: N. J. Cen. Div.*)
Levis & Kennebec R. R. (*See Quebec Cen.*)
Litchfield, Carrollton & Western R. R. 4-8½ g. 22 m.
H. S. Carroll, *Prest. & G. Man*..Carrollton, Ill.
Ligonier Valley R. R. 4-9 g. 11 m. 2 lo. 22 cars.
Thos. A. Mellon, *Gen. Manager*..Pittsburgh, Pa.
Geo. Senft, *Supt. & P. Agt*........Latrobe, Pa.
Little Miami R. R. (*See Penna. Co.'s Rds*; (8) *Div.*)
Little Rock, Miss. River & Texas Ry.
4-8½ g. 170 m. 12 lo. 200 cars.
H. Wood, *Gen Man*..........Little Rock, Ark.
F. A. Lister, *Gen. Supt*........Little Rock, Ark.
F. Hufsmith, *M. M. & C. B*..........Argenta, Ark.
Little Rock & Fort Smith. 4-8½ g. 170 m. 13 lo. 360 c.
Hy. Wood, *Gen. Man*..........Little Rock, Ark.
F. A. Lister, *Supt*.............Little Rock, Ark.
F. Hufsmith, *M. M. & M. C. B*.....Argenta, Ark.
Little Saw Mill Run R. R. 3 & 4-8½ g. 8 m. 4 lo. 327 c.
T. Hartley, *Gen. Man*............Banksville, Pa.
Long Island R. R. 4-8½ g. 352 m. 92 lo. 953 cars.
I. D. Barton, *Gen. Supt*. Long Island City, N. Y.
Benj. Norton, *Pur. Agt*. Long Island City, N. Y.
C. A. Thompson, *M. M* Long Island City, N. Y.
Longview & Sabine Valley R. R. (*See Gal. Sab. & St. L.*)
Louisiana W'n R. R. (*See Cen. Pac.; G., H. & S. A. Div.*)
Louisville, Cin. & Lexington R. R. (*See Louis. & N.*)
Louis., Evans. & St. L. Ry. 4-8½ g. 254 m. 24 lo. 1,032 c.
Geo. F. Evans, *Rec*.........................
R. S. Minor, *Gen. Supt*..........Louisville, Ky.
F. P. Boatman, *M. M*............Evansville, Ind.
Louisville, New Albany & Chicago Ry.
4-8½ g. 479 miles 60 lo. 3,700 cars.
John B. Carson, *Gen. Man*..........Chicago, Ill.
W. R. Woodard, *Gen. Supt*..........Chicago, Ill.
H. O. Nourse, *Pur. Agt*..........Chicago, Ill.
Josiah Bettis, *M. M*..........New Albany, Ind.
Chas. Coller, *M. C. B*..........New Albany, Ind.
C. C. F. Bent, *Supt. Trans*..........Lafayette, Ind.
Louisville, New Orleans & Tex. Ry. 455 m. In progress.
Jas M. Edwards, *Gen. Man*.....Memphis, Tenn.
M. Burke, *Gen. Supt*..........Memphis, Tenn.
John Bradley, *Asst. Supt*.....New Orleans, La.
A. M. Cooke, *Pur. Agt*..........Memphis, Tenn.
E. D. Anderson, *M. M*..........Vicksburg, Miss.
J. J. Casey, *M. C. B*..........Vicksburg, Miss.

Louisville & Nashville R. R.
5 g. 2,186 m. 380 lo. 12,197 cars.
J. A. Harrahan, *Gen. Man*.....Louisville, Ky.
J. T. Harahan, *Asst Gen. M*....Louisville, Ky.
Geo. F. Evans, *Supt*..........Louisville, Ky.
P. P. Huston, *Pur. Agt*.........Louisville, Ky.
Harvey Middleton, *Supt. Mach*..Louisville, Ky.
Louisv., Cin. & Lex. Divs.:
J. G. Metcalf, *Supt. Trans*......Louisville, Ky.
P. Leeds, *M. M*..................Louisville, Ky.
J. W. Luttrell, *M. M*..........Louisville, Ky.
J. G. Clifford, *M. M.* (2d & C. Div.). Bowling Grn. Ky.
Henderson Div.: J. Geddes, *Supt.* Henderson, Ky.
W. F. Pike, *M. M*..................Nashville, Tenn.
Nash. & D. Div.: J. Geddes, *Supt.* Nashville, Tenn.
Elkton & Guthrie:
J. Geddes, *Supt*.................Nashville, Tenn.
S. & N. A. Div.: Levi Hedge, *Supt.* Birmingham, Ala.
C. W. White, *M. M*..........Birmingham, Ala.
Mob. & M.; N. Div. Pens. & Sel.; Sl. & Mont. R. Rs.:
B. C. Epperson, *Supt*.......Montgomery, Ala.
J. N. Hall, *M. M.* (Mont. Shops). Montgomery, Ala.
N. O. Div.: O. M. Dunn, *Supt*...New Orleans, La.
Wm. Adair, *M. M*..................Mobile, Ala.
Memp. Div.: W. Colcamp, *Supt.* Memphis, Tenn.
J. V. Slusser, *M. M*..........Memphis, Tenn.
St. L. Div.: C. O. Parker, *Supt.* Montgomery, Ala.
Thos. Walsh, *M. M*..........Mt. Vernon, Ill.
Pensacola and So. Div. Pens. & Selma and P. & A. Rds.:
E. O. Saltmarsh, *Supt*...........Pensacola, Fla.
W. D. Robb, *M. M*...............Pensacola, Fla.
Louisville & Wadley R. R. 5 g. 10 m. 1 lo. 5 c.
J. H. Wilkins, *Supt. & Pur. Agt.* Louisville, Ga.

M

Macon & Brunswick R. R.
(*See E. Tenn., Vir. & Ga.; At. & Ga. Divs.*)
Maine Central R. R. 4-8½ g. 525 m. 82 lo. 2,168 c.
Payson Tucker, *Gen. Man*........Portland, Me.
Amos Pillsbury, *M. M*..........Waterville, Me.
C. H. Kenison, *M. C. B*............Augusta, Me.
Eastern Maine. 3 g. 19 m. 2 lo. 40 c.
L. L. Lincoln, *Supt*..........Portland, Me.
Manchester & Keene R.R. 4-8½ g. 30 m. (*See Concord.*)
Manchester & Lawrence R. R. (*See Concord.*)
Manchester & North Weare R. R. (*See Concord.*)
Manhattan Ry. 4-8½ g. 32 m. 228 lo. 652 pass. c.
Frank K. Hain, *Gen. Man*.....New York, N. Y.
W. T. Goundie, *Supt. Trans*. .New York, N. Y.
T. W. Peeples, *M. M*..........New York, N. Y.
H. A. Webster, *M. C. B*.........New York, N. Y.
Manitoba Southwestern Colonization Ry.
4-8½ g. 52 m. 3 lo. 125 cars.
J. M. Eagan, *V. Pres*..........Winnipeg, Man.
W. T. Reed, *M. M*..............Winnipeg, Man.
Marietta & Cincinnati R. R. (*See Cin. Wash. & Balt.*)
Marietta & North Georgia R. R. 3 g. 70 m. 4 lo. 45 c.
J. B. Glover, *Gen. Man*...........Marietta, Ga.
W. R. Power, *Pur. Agt*...........Marietta, Ga.
C. Chester, *M. M*..................Marietta, Ga.
Marquette, Houghton & Ontonagon R. R.
4-8½ g. 100 m. 42 lo. 2,530 cars.
John Hornby, *Gen. Man*.......Marquette, Mich.
W. A. Thompson, *Ass't Supt.* Marquette, Mich.
M. B. McGee, *Pur. Agt*......Marquette, Mich.
W. A. Mahan, *M. M*.........Marquette, Mich.
H. D. Lyons, *M. C. B*.........Marquette, Mich.
Maryland Central R. R. 3 g. 27 m. 4 lo. 56 cars.
S. G. Boyd, *Supt*..................Baltimore, Md.
Marquette & Western. 4-8½ g. 25 m. 10 l. 500 c.
D. McCool, *Gen. Supt*.........Marquette, Mich.
W. J. Tench, *Pur. Agt*.........Marquette, Mich.
J. B. Wilson, *Mech. Supt*.......Marquette, Mich.
Massachusetts Central R. R. 4-8½ g. 48 m. 5 l. 81 c.
E. G. Allen, *Supt. & Pur. Agt*....Boston, Mass.
E. A. Walker, *M. M*.........So. Sudbury, Mass.
Memphis & Charleston R. R. (*See E. Tenn. Va. & Ga.*.
Memphis & Lit. Rock R. R. 5 g. 135 m. 14 lo. 299 c.
R. Fink, *G. Man. & P. A*......Little Rock, Ark.
Supt..........Memphis, Tenn.
Thos. Rennell, *M. M*...............Argenta, Ark.
T. Rennell, *M. C. B*..............Argenta, Ark.
Mexican Ry. 4-8½ g. 293 m. 42 lo. 616 cars.
E. W. Jackson, *Gen. Man*.........Mexico, Mex.
Geo. Foote, *Gen Supt*...........Mexico, Mex.
Mexican Central Ry. 4-8½ g. 1,224 m. 94 lo. 2,609 c.
Theo. Nickerson, *Pur. Agt*......Boston, Mass.
E. W. Jackson, *Gen. Man*...El Paso del Norte.
D. MacKenzie, *Gen. Supt*.......City of Mexico.
F. W. Johnstone, *Supt. M. P. & M.* City of Mexico.
J. H. O'Brien, *M. M*...........City of Mexico.
G. T. Jarvis, *Div. Supt*.........City of Mexico.
A. Smith, *Div. Supt*.................Silao, Mex.
I. A. Eacutt, *Div. Supt*...........Jimulco, Mex.
R. E. Comfort, *Div. Supt*..Paso del Norte, Mex.
R. S. Simpson, *M. M*............City of Mexico.
A. Hendee, *M. M*...................Calera, Mex.
C. F. Stewart, *M. M*..................Silao, Mex.
W. L. Wallace, *M. M*.............Jimulco, Mex.
J. G. McCuen, *M. M*.........Chihuahua, Mex.
Tampico Div: E. A. Whorf, *Supt.* Tampico, Mex.
San Blas Div.: C. E. Payne, *Supt.* San Blas, Mex.
Mexican National Ry. 3 g. 766 m. 50 lo. 1,283 c.
Northern General Division:
D. C. Dodge, *V. P. & Gen. Man*...Laredo, Tex.
C. A. Merriam, *Gen. Supt*.......Laredo, Tex.
F. W. Baldwin, *Asst. Gen. Supt*..Laredo, Tex.
John Grace, *M. M*..................Laredo, Tex.
T. Milan, *M. M*...........Corpus Christi, Tex.
Metamoras, Div.:
W. W. Mayberry, *Asst. Supt*..Brownsville, Tex.
Galveston Div.:
T. E. Quinn, *Asst. Supt*.........Galveston, Tex.
Southern General Division:
W. E. Lewis, *Supt*.................Mexico, Mex.
R. C. Peebles, *Asst. Supt*.........Mexico, Mex.
J. M. Winslow, *M. M*.............Mexico, Mex.
Zacatecas Div.:
C. Langrand, *Manager*.........Zacatecas, Mex.
Michigan Cen. R. R. 4-8½ g. 1,485 m. 357 lo. 11,284 c.
H. B. Ledyard, *Pres. & Gen. Man.* Detroit, Mich.
E. C. Brown, *Gen. Supt*.........Detroit, Mich.
Robert Miller, *Asst. Gen. Supt*...Detroit, Mich.
Allan Bourn, *Pur. Agt*...........Detroit, Mich.
C. E. Smart, *Gen. M. M*.........Jackson, Mich.
(1) Lines West of Detroit River:
E. C. Brown, *Gen. Supt*.........Detroit, Mich.
East. Div.: D. S. Sutherland, *Supt.* Detroit, Mich.
Bay City, Saginaw & Mackinaw Divisions.:
W. A. Vaughan, *Supt*.........Bay City, Mich.
C. E. Smart, *M. M*.............Bay City, Mich.
Main Line: Gr. Rap.; So. Bend; and So. Hav. Divs.:
C. B. Bush, *Supt*.................Jackson, Mich.
W'n Divs.: R. H. L'Hommedieu, *Supt.* Chicago, Ill.
(2) Lines East of Detroit River:
J. B. Morford, *Supt*.........St. Thomas, Ont.
A. F. Bull, *M. M*...............St. Thomas, Ont.
Rob't Potts, *M. C. B*.........St. Thomas, Ont.
Michigan & Ohio.
L. A. Latcha, *Gen. Man*...............Toledo, O.
W. L. Webb, *Pur. Agt*...............Toledo, O.
D. J. Durrell, *M. M*............Marshall, Mich.
Middleburg & Schoharie; and Schoharie Valley R. Rs. 4-8½ g. 11 m. 2 lo. 6 cars.
P. S. Danforth, *Gen. Supt*... Middleburg, N. Y.
Midland of Canada. (*See Grand Trunk.*)
Midland No. Carolina Ry. 5 g. 95 m. 9 lo. 82 cars.
Atlantic & North Carolina Ry. 22 m.
John D. Whitford, *Gen. Man*..Newbern, N. C.
J. A. Bryan, *Supt*...............Newbern, N. C.
D. J. Sprague, *Pur. Agt*........New York, N. Y.
B. Manly, *Supt. of Mach*.........Newbern, N. C.
Milford & Woonsocket.
W. W. Jencks, *Supt*...............Milford, Mass.
Milton & Sutherlin. (*Oper. by Rich. & Danville.*)
Milwaukee, Lake Shore & Western Ry.
4-8½ g. 370 m. 45 lo. 1,536 cars.
H. F. Whitcomb, *Gen. Supt*...Milwaukee, Wis.
J. Donahue, *Supt*...............Milwaukee, Wis.
John Hickey, *M. M*...............Ledyard, Wis.
Milwaukee & Northern and Wisconsin & Michigan R. Rds. 4-8½ g. 228 m. 24 l. 703 cars.
C. F. Dutton, *Gen. Supt*.........Milwaukee, Wis.
N. S. Kimball, *M. M*..............Ft. Howard, Wis.
Mineral Range R. R. 3 g. 13 m. 4 lo. 43 cars
Chas. E. Holland, *Pr. & Supt*...Hancock, Mich.
C. A. Wright, *Gen. Man*.........Hancock, Mich.
W. H. Carr, *Pur. Agt*............Hancock, Mich.
T. J. Shellhorn, *M. M. & C. B*..Hancock, Mich.

Minnesota & Northwestern.
R. Du Puy, *Supt*..................St. Paul, Minn.
Minneapolis, Lyndale & Minnetonka Ry.
3 g. 25 miles 4 motors 1 lo. 35 cars.
William McCrory, *Man*.....Minneapolis, Minn.
T. W. Heintzelman, *M. M*.. Minneapolis, Minn.
Minneapolis, S. Ste. Marie & Atlantic Ry.
4-8½ g. 45 m.
W. W. Rich, *Supt*..........Minneapolis, Minn.
Minneapolis & St. Louis Ry.
4-8½ g. 560 m. 72 lo. 2,060 c.
W. H. Truesdale, *V. Pres*..Minneapolis, Minn.
T. E. Clarke, *Gen. Supt*....Minneapolis, Minn.
W. B. Palmer, *Pur. Agent* Minneapolis, Minn.
G. F. Wilson, *M. M. & M. C. B.* Minneapolis, Minn.
Missisquoi R. R. 4-8 g. 28 m.
W. C. Smith, *Man*..............St. Albans, Vt.
Mississippi, Terre aux Bœufs & Lake R. R.
29 miles.
M. R. Spelman, *Supt*.........New Orleans, La.
Mississippi & Tenn. R. R. 4-8½ g. 101 m. 12 lo. 194 c.
Jas. M. Edwards, *Gen. Man*....Memphis, Tenn.
J. C. Ramsey, *M. M*..............Memphis, Tenn.
S. J. Bolton, *M. C. B*...........Memphis, Tenn.
Missouri, Iowa & Nebraska R. R. 4-8½ g. 143 m.
H. T. Clark, *Supt*..............Alexandria, Mo.
Missouri, Kansas & Texas Ry. (*See Mo. Pac.; (2) Div.*)
Missouri Pacific Ry. (Leased and operated lines.)
4-8½ g. 6,029 m. 697 lo. 19,748 cars.
H. M. Hoxie, *3d V. Pres*..........St. Louis, Mo.
Wm. Kerrigan, *Gen. Supt*..... St. Louis, Mo.
R. B. Lyle, *Pur. Agt*...............St. Louis, Mo.
(1), (2) and (3) Divs.:
John Hodge, *Supt. Car Dep*.......St. Louis, Mo.
(4), (5) and (6) Divs.:
O. A. Haynes, *Insp. L. C. & M*...St. Louis, Mo.
(1) Missouri Pacific Ry. 1,028 m. 155 lo. 4,218 cars.
E. K. Sibley, *Supt*..................Sedalia, Mo.
T. W. Newell, *M. M*...............Sedalia, Mo.
E. Taylor, *Asst M. M*.............Sedalia, Mo.
W'n Div.: Sedalia, Mo.
L. Bartlett, *M. M*................St. Louis, Mo.
(2) Mo., Kan. & Tex. Ry. 1,308 m. 140 lo. 4,248 cars.
Jos. Herrin, *Supt*..................Sedalia, Mo.
J. J. Frey, *Div. Supt*................Sedalia, Mo.
T. G. Golden, *Div. Supt*..........Parsons, Kan.
S. Irvin, *Asst. Supt. Car Dep*...... Sedalia, Mo.
E. K. Sibley, *Supt*.................Parsons, Kan.
W. E. Phillips, *M. M*...............Parsons, Kan.
(3) Central Branch Un. Pac. R. R. 388 m. 30 lo. 599 c.
W. W. Fagan, *Supt*...............Atchison, Kan.
H. V. Faries, *M. M*...............Atchison, Kan.
J. W. Blackburn, *A. Supt. Car D*..Atchison, Kan.
(4) St. L., I. Mt. & So'n Ry. 905 m. 138 lo. 4,928 c.
H. G. Fleming, *Supt*...............St. Louis, Mo.
St. Louis Div.: W. H. Harris, *M. M*..De Soto, Mo.
Ark. Div.: *Supt*..... ..Little Rock, Ark.
R. M. Richardson, *M. M*....Little Rock, Ark.
(5) Int. & G. No.: *Supt*..Palestine, Tex.
M. M.........Palestine, Tex.
(6) Tex. & Pac: Warder Cumming, *Supt.* Marshall, Tex.
E. N. O. & Tr. Cont. Divs.:
Geo. Dimick, *Supt*...............Marshall, Tex.
E. R. Smith, *M. M. & M. C. B*..N. Orleans, La.
Rio Grande Div.:
L. L. Keller, *Supt*............Big Springs, Tex.
Mobile & Ala. Grand Trunk R. R. 5 g. 59 m. 2 lo. 23 c.
Wm. H. Pratt, *Trustee*...............Mobile, Ala.
Mobile & Girard R. R. 5 g. 84 m. 7 lo. 112 cars
W. L. Clark, *Gen. Supt*...........Columbus, Ga.
J. C. Albrecht, *M. M*..............Columbus, Ga.
A. J. Nix, *M. C. B*.................Columbus, Ga.
Mobile & Montgomery Ry. (*See Louis. & Nash.*)
Mobile & Northwestern R. R. 3 g. 31 m. 2 lo. 16 c.
Thomas T. A. Lyon, *Pres*.......Glendale, Miss.
Mobile & Ohio R. R. 5 g. 528 m. 75 lo. 1,353 cars.
T. M. R. Talcott, *V.-Pr. & Gen. Man* Mobile, Ala.
J. G. Motley, *Gen. Supt*............Mobile, Ala.
F. Jordan, *Pur. Agt*..................Mobile, Ala.
M. T. Carson, *Gen. M. M*...........Whistler, Ala.
J. T. Booth, *M. C. B*...............Whistler, Ala.
So'n Div.:..............................Mobile, Ala.
L. J. Morris, *M. M*..................Macon, Miss.
No'n Div.: E. S. Hosford, *Supt*.. Jackson, Tenn.
H. C. Goode, *M. M*..............Jackson, Tenn.
Mobile & Spring Hill R. R. 5-2 g. 8 m. 1 lo. 16 cars.
F. Ingate, *Manager*..................Mobile, Ala.
Moline & Southeastern R. R. 3-6 g. 8 m. 2 lo. 26 c.
R. Battersly, *Gen. Man*...........Coal Valley, Ill.
Mont Alto R. R. 4-9 g. 21 m. 2 lo. 8 cars.
G. B. Wiestling, *Supt. & P. A*....Mont Alto, Pa.
Montgomery & Eufaula Ry. (*See Cen. of Ga.*)
Montgomery Southern Ry. 3 g. 20 m. 1 lo. 15 cars.
S. D. Hubbard, Jr., *Gen. Man.* Montgomery, Ala.
Montour R. R. 4-8½ g. 12 m. 2 lo. 130 cars.
C. R. Brown, *Supt. & Pur. Agt*...Imperial, Pa.
Henry Newman, *M. C. B*...........Imperial, Pa.
Montpelier & Wells Riv. R. R. 4-8½ g. 38 m. 3 lo. 86c.
W. A. Stowell, *Supt*...............Montpelier, Vt.
Montreal Portland & Boston Ry. (*See Passumpsic.*)
Montreal & Sorel Ry. 4-8½ g. 47 m. 3 lo. 35 c.
C. N. Armstrong, *G. M. & Pur. Agt.* Sorel, P. Q.
J. F. Armstrong, *Gen. Supt*..........Sorel, P. Q.
G. W. Pangborn, *M. M*..............Sorel, P. Q.
Montrose Ry. 3 g. 28 m. 3 lo. 24 cars.
T. G. Walter, *Gen. Supt*... Tunkhannock, Pa.
Morgan's Louis. & Tex. R. R. 4-8½ g. 260 m. 46 l. 1,339 c.
J. Kruttschnitt, *Supt*.........New Orleans, La.
C. Trumpy, *Pur. Agt*.........New Orleans, La.
J. D. Connell, *M. M*...............Algiers, La.
Jno. Hildebrand, *M. C. B*..........Algiers, La.
Mount Washington R. R. 5-8 g. 3 m. 6 lo. 6 cars.
Walter Aiken, *Gen. Man*..........Franklin, N. H.

N

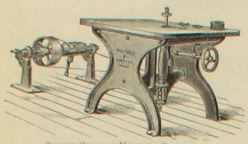
Nantasket Beach R. R. 4-8½ g. 6 m. 5 lo. 25 c.
George L. Keyes, *Gen. Supt*......Boston, Mass.
Naugatuck R. R. 4-8½ g. 62 m. 17 lo. 547 cars.
Geo. W. Beach, *Supt*.........Waterbury, Conn.
H. A. Bishop, *Pur. Agt*.........Bridgeport, Conn.
H'y D. Beach, *Supt. R. S*......Bridgeport, Conn.
Napanee, Tamworth & Quebec Ry. In progress.
Ed. W. Rathbun, *Gen. Man*....Deseronto, Ont.
R. C. Carter, *Asst. Gen. Man*..Deseronto, Ont.
Narragansett Pier R. R. 4-8½ g. 8 m. 2 lo. 11 c.
G. T. Lanphear, *Supt. & Pur. Agt.* Peacedale, R. I.
Nashua & Rochester R. R. (*See Wor. & Nash.*)
Nashville, Chattanooga & St. Louis Ry.
5 g. 539 miles 87 lo. 1,979 cars.
J. W. Thomas, *G. Man. & P. Agt.* Nashville, Tenn.
M. J. C. Wrenne, *Supt*..........Nashville, Tenn.
James Cullen, *M. M. & C. B*...Nashville, Tenn.
Nashville & Florence R. R. 5 g. 51 m.
J. Geddes, *Supt*...................Columbia, Tenn.
Natchez, Jackson & Col. R. R. 3-6 g. 100 m. 7 lo. 92 c.
E. D. Frost, *Gen. Supt*............Natchez, Miss.
Nebraska, Topeka, Iola & Memphis R.R. 4-8½ g. 16 m.
H. M. Clarke, *Gen. Man*..............Girard, Kan.
C. H. Malin, *Gen. Supt*..............Girard, Kan.
New Brunswick Ry. 4-8½ g. 447 m. 40 lo. 935 cars.
F. W. Cram, *G. M. & Pur. Agt*..St. John, N. B.
Geo. A. Haggerty, *M. M*..........McAdam, N. B.
Jas. Jackson, *Asst. M. M*.........McAdam, N. B.
New Brunswick & Can. Ry. (*See New Brun.*)
Newburg, Dutchess & Conn. R. R. 4-8½ g. 58 m.
C. L. Kimball, *Supt. & P. Agt.* Matteawan, N. Y.
New Castle R. R. 3-6 g. 5 m. 2 lo. 76 cars.
Geo. Pearson, *Gen. Man*..........New Castle, Pa.
New Castle & Beaver Valley R. R. (*See Penna. Co.*)
New Haven & Derby R. R. 4-8½ g. 13 m. 4 lo. 70 c.
E. S. Quintard, *Supt*............New Haven, Conn.
J. M. Whitlock, *M. M. & C. B.* New Haven, Conn.
New Haven & No'mpton. 4-8½ g. 170 m. 28 lo. 579 c.
S. B. Opdyke, Jr., *Supt*.........New Haven, Ct.
R. G. Curtis, *Pur. Agt*.........New Haven, Ct.
Henry Fox, *M. M*...................New Haven, Ct.
John Sweeny, *For Car. Shps*...New Haven, Ct.
New Jersey & New York Ry. 4-8½ g. 37 m. 6 lo. 40 c.
J. D. Hasbrouck, *Gen. Man* Jersey City, N. J.
J. S. Drake, *Supt. & M. M*.........Hillsdale, N. J.
L. B. Van Wagonen, *M. C. B*.......Hillsdale, N. J.
N. J. Southern Ry. (*See Phil. & Read.; N. J. So. Div.*)
New London Northern R. R. (*See Central Ver.*)
New Orleans, B. Rouge, Vicks. & Memphis.
Jas. M. Edwards, *Gen. Man*..New Orleans, La.
John Bradley, *Supt*...............New Orleans, La.
New Orleans Pacific Ry. (*See Mo. Pac.; (6) Div.*)
New Orleans & Carrollton R. R.
4-8½ g. 15 m. 12 lo. 70 cars.
C. V. Haile, *Supt*...............New Orleans, La.

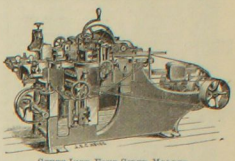
John Dahmer, *M. M*.........New Orleans, La.
Jas. Thorn, *M. C. B*.........New Orleans, La.
New Orleans & Mobile R. R. (*See Louis. & Nash.*)
N. O. & Northeastern R. R. (*See Cin., N. O. & Tex. Pac.*)
New Orleans & Selma R. R. 5 g. 21 m. 1 lo. 8 cars.
L. B. Schofield, Supt...............Selma, Ala.
Newport & Wickford R. R. 4-8½ g. 22 m.
Theo. Warren, *Supt*.................Newport, R. I.
Nevada Central R. R.:
C. W. Hinchcliffe, *Rec. & Supt*...Austin, Nev.
Louis Parisoe, *M. M*.....Battle Mountain, Nev.
J. B. Gilchrist, *Pur. Agt*.........Austin, Nev.
Nevada County N. G. R. R. 3 g. 23 m. 3 lo. 46 cars.
John F. Kidder, *Supt*..........Grass Valley, Cal.
Jas. McCormick, *M. M. & C. B.* Grass Valley, Cal.
Nevada & Oregon R. R. 3 g. 30 m. 25 cars.
D. W. Balch, *Supt*........................Reno, Nev.
N. Y. Central & Hudson River R.R.
4-8½ g. 983 m. 676 lo. 25,161 cars.
J. M. Toucey, *Gen. Supt*...... New York, N. Y.
Chas. Reed, *Pur. Agt*......... New York, N. Y.
Wm. Buchanan, *Supt. M. P. and R. Stock*, New York, N. Y.
N. Y. & Har. Div.: C. M. Bissell, *Supt*. do.
P. McQ. Gibson, *M. M*..........New York, N. Y.
Hud. Riv. Div.: C. M. Bissell, *Supt.* N. York, N. Y.
W. H. Wolfrath, *M. C. B*....New York, N. Y.
E'n Div.: Zenas C. Priest, *Supt.* Ltle Falls, N. Y.
John Ortton, *M. M*..........West Albany, N. Y.
L. Packard, *M. C. B*......West Albany, N. Y.
W'n Div.: Geo. H. Burrows, *Supt*...Buffalo, N. Y.
S. L. White, *M. M*...............Syracuse, N. Y.
Amos Gould, *M. M*................E. Buffalo, N. Y.
E. Chamberlain, *M. C. B*... E. Buffalo, N. Y.
Peter Smith, *M. O. B*..... E. Rochester, N. Y.
Rd. Donaby, *M. C. B*....Niagara Falls, N. Y.
N. Y. Chic. & St. L. Ry. 4-8½ g. 524 m. 108 lo. 7,245 c.
Lewis Williams, *Gen. Man*..... . Cleveland, O.
M. M. Rogers, *Pur. Agt*..........Cleveland, O.
Jno. Mackenzie, *Supt. M. P*.......Cleveland, O.
Eas'tn Div.: G. H. Kimball, *Supt*...Cleveland, O.
E. A. Miller, *M. M*................Conneaut, O.
West'n Div.: C. D. Gorham, *Supt*....Chicago, Ill.
W. H. Lewis, *M. M*...............Englewood, Ill.
New York City & Northern. 4-8½ g. 58 m. 17 lo. 368 c.
Frank S. Gannon, *Gen. Supt.* High Bridge, N. Y.
Thos. Millen, *M. M*..........High Bridge, N. Y.
New York, Lackawanna & W'n Ry. (*See Del. L. & W.*)
New York, Lake Erie & Western R. R.
S. M. Felton, Jr., *V. Pr*....... New York, N. Y.
(1) N. Y., L. E. & W. Div.: 4-8½ g. 1,073 m. 576 lo. 30,553 c.
B. Thomas, *Gen. Supt*.........Jersey City, N. J.
W. G. Tuller, *Pur. Agt*.........New York, N. Y.
F. M. Wilder, *Supt. M. P. & M*...Susqueh'a, Pa.
E'n Div.: E. O. Hill, *Supt*......Jersey City, N. J.
J. H. Vreeland, *M. M*...... Jersey City, N. J.
J. N. Mileham, *M. C. B*.....Jersey City, N. J.
Del. Div.: E. Van Etten, *Supt*..Port Jervis, N. Y.
J. Van Vechten, *M. M. & C. B.* Pt. Jervis, N. Y.
Susq. Div.: R. B. Cable, *Act. Supt*..Elmira, N. Y.
V. Blackburn, *M. M*.........Susquehanna, Pa.
D. B. Goodell, *M. C. B*..............Elmira, N. Y.
Buf. & R. Divs.: W. J. Murphy, *Supt.*; and
Wm. Litz, *M. M*......................Buffalo, N. Y.
Robert Gunn, *M. C. B*..... . Buffalo, N. Y.
B. & S.-W. Div.: C. A. Brunn, *Supt*. do.
W'n Div.: W. B. Coffin, *Supt*..Hornellsville, N. Y.
J. Hawthorne, *M. M*......Hornellsville, N. Y.
N. Y. & Greenwood L. Ry. 4-8½ g. 44 m. 8 lo. 53 c.
Stephen Smith, *Supt*..........Jersey City, N. J.
F. A. Stinard, *M. M*.............Pompton, N. J.
(2) N. Y., Pa. & O. Div.: 4-8½ g. 565 m. 221 lo. 7,794 c.
W. M. Clements, *Gen. Supt*..Cleveland, Ohio.
J. H. Holway, *Pur. Agt*.... ..Cleveland, Ohio.
Wm. Fuller, *Supt. M. P*.........Cleveland, O.
S. V. Smith, *Asst. Gen. M. C. B*. ...Kent, Ohio.
E'n Div.: A. L. Dunbar, *Supt*.......Meadville, Pa.
J. A. Cooper, *M. M*..............Meadville, Pa.
D. S. Dockstader, *M. C. Rep*...Meadville, Pa.
W'n Div.: A. M. Tucker, *Supt*....... Galion, O.
Wm Hill, *M. M*.........................Galion, O.
Geo. Wilson, *For. Car Rep*.....Galion, Ohio.
Maho'g Div.: N. F. Wood, *Supt*......Cleveland, O.
N. Wright, *M. M*.....................Cleveland, O.
C. N. Thorp, *M. C. Rep*........Cleveland, O.
New York, New Haven & Hartford R. R.
4-8½ g. 203 m. 123 lo. 2,768 cars.
E. M. Reed, *V. P. & Gen. Supt.* New Haven, Ct.
R. N. Dowd, *Pur. Agt*..........New Haven, Ct.
John Henney, Jr., *Supt. M. P*...New Haven, Ct.
N. Y. & N. H. Div.: W. H. Stevenson, *Supt*...N. Y.
Shore Line and Air Line Divs.:
W. A. Waterbury, *Supt*.....New Haven, Ct.
Jas. Denver, *M. C. B*.........New Haven, Ct.
Hart. Div.: C. S. Davidson, *Supt*....Hartford, Ct.
O. C. Lackey, *M. M*................Hartford, Ct.
Jno. Whitmore, *For. C. Dept*...Hartford, Ct.
N. Y., Ontario & Western Ry. (*See N. Y., W. Sh. & Buf.*)
N. Y., Pittsb'h & Chicago. 4-8½ g. 20 m. 2 lo. 32 c.
Geo. W. Dixon, *Supt*..........New Galilee, Pa.
H. T. Hanna, *Pur. Agt*..........Pittsburgh, Pa.
N. Y., Pennsylvania & Ohio R. R. (*See N. Y., L. E. & W.*)
New York, Philadelphia & Norfolk R. R.
4-8½ g. 10 m. 1 lo. 4 cars.
H. W. Dunne, *Supt*..........Cape Charles, Va.
New York, Providence & Boston R. R.
4-8½ g. 83 m. 29 lo. 430 cars.
J. B. Gardner, *Supt*..........Providence, R. I.
J. L. Hayden, *Pur. Agt*......Stonington, Conn.
Geo. H. Griggs *M. M. & C. B*..Providence, R. I.
N. Y., Susqueh'na & W'n. 4-9 g. 147 m. 33 lo. 1,469 c.
F. A. Potts, *Gen. Man*..........New York, N. Y.
C. D. McKelvey, *Supt*..........Jersey City, N. J.
C. T. Demarest, *Pur. Agt*.....New York, N. Y.
W. C. Ennis, *M. M. & C. B*...Wortendyke, N. J.
New York, Texas & Mexican Ry.
4-8½ g. 92 m. 6 lo. 95 cars.
M. D. Monserate, *Gen. Man*....Victoria, Tex.
J. G. Conlon, *M. M*..................Victoria, Tex.
New York, West Shore & Buffalo.
4-8½ g. 850 m. 177 lo. 7,291 c.
J. D. Layng, *Gen. Man*..........New York, N. Y.
C. W. Bradley, *Gen. Supt*.....Weehawken, N. J.
P. S. Bemis, *Pur. Agt*..........New York, N. Y.
R. H. Soule, *Supt. M. P*......Frankfort, N. Y.
H. R. Div.: J. P. Bradfield, *Act. Supt.*, Weehawken, N. J.
Thos. Oldcorn, *M. M*.....New Durham, N. J.
Buff. Div.: D. B. McCoy, *Supt*.....Newark, N. Y.
N. Falls Div.: W. J. Murphy, *Supt*. Buffalo, N. Y.
Coeymans to Newark.
Jas. M. Boon, *M. M*..........Frankfort, N. Y.
Newark to Buffalo.
Geo. W. West, *M. M*....... East Buffalo, N. Y.
New York, Ontario & Western.
J. E. Childs, *Gen. Supt*........New York, N. Y.
N. Y. Woodhaven & Rockaway R. R. (*See Long Is.*)
N. Y. & Greenwood Lake Ry. (*See N. Y., L. E. & W.*)
N. Y. & Manhattan Beach Ry. (*See Long Island.*)
New York & Long Branch R. R. (*See Phil. & Read.*)
New York & New England R. R.
4-8½ g. 473 m. 145 lo. 3,959 cars.
W. H. Turner, *Gen. Supt*........ Boston, Mass.
W. W. McKim, *Pur. Agt*.......Boston, Mass.
J. B. Henney, *Supt. M. P*.......Boston, Mass.
W. H. Griggs, *M. M*..........Norwood, Mass.
Elias E. Pratt, *M. C. B*.........Norwood, Mass.
East Div: E. G. Allen, *Supt*........Boston, Mass.
Nor. Div.: P. St. M. Andrews, *Supt*...Norwich, Ct.
S. F. Whaley, *M. M*................Norwich, Ct.
Prov. Div.: L. W. Palmer, *Supt*..Providence, R. I.
Hfd. Div.: E. Holbrook, *Supt*.......Hartford, Ct.
E. M. Humstone, *M. M*..........Hartford, Ct.
West'n Div.: C. H. Platt, *Supt*.....Fishkill, N. Y.
Woons'kt Div.:
E. N. Tucker, *Supt*..........Needham, Mass.
New York & Sea Beach R. R. 4-8½ g. 6 m. 6 lo. 41 c.
W. O. McDowell, *Gen. Man*...New York, N. Y.
C. W. Douglass, *Gen. Supt*...Bay Ridge, N. Y.
Newark, Somerset & Straitsville R. R. (*See B. & O.*)
Newburg, Dutchess & Conn. R. R. 4-8½ g. 59 miles.
C. L. Kimball, *Gen. Supt*.....Matteawan, N. Y.
W. G. Van Buskirk, *M. M. & C. B.*, Dutchess Junction, N. Y.
Newfoundland Ry. 3-6 g. 45 m. 7 lo. 41 c.
C. X. Hobbs, *Gen. Man*..........St. John's N'f'd
Norfolk Southern R. R. 4-8½ g. 74 m. 7 lo. 182 c.
M. K. King, *Gen. Man. & Pur. Agt.* Norfolk, Va.
J. S. Whitworth, *M. M. & C. B*....Norfolk, Va.

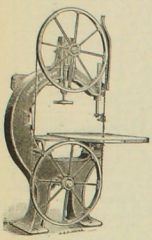
WOOD-WORKING MACHINERY

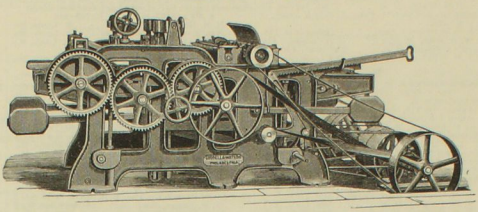
FOR

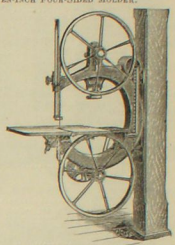
PLANING MILLS,
CAR SHOPS,
RAILWAY SHOPS,
BRIDGE BUILDERS,
Etc., Etc.

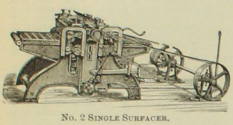

Single Spindle Upright Shaper.

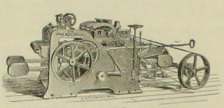

Seven-Inch Four-Sided Molder.

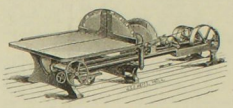

35-Inch Band Saw.

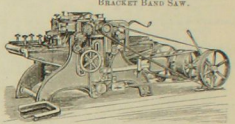

CAR SILL PLANER AND DOUBLE-SURFACER AND JOINTER.


Bracket Band Saw.


No. 2 Single Surfacer.


"The Philadelphia" Endless Bed D. S.


New Railway Cut-Off Saw.


No. 2 Single Surfacer and Matcher.

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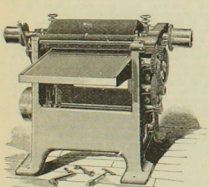
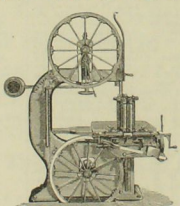
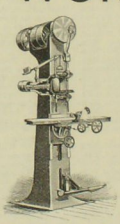
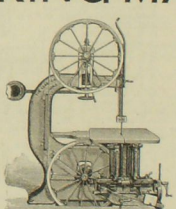
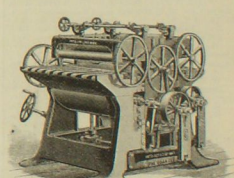
IMPROVED WOOD-WORKING MACHINERY.


No. 2¼ Planer and Smoother. Planes 20 inches wide and 6 inches thick.


No. 4½ Band Scroll and Resaw. Adjusted for Resawing.


No. 2 Improved Power Mortiser.


No. 4½ Band Scroll and Resaw. Adjusted for Scrolling.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CAR GAINING,
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BAND AND SCROLL SAWING,
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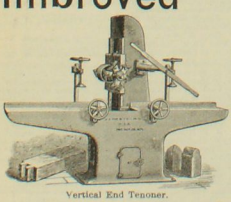
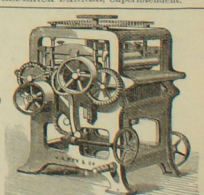

Vertical End Tenoner.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CAR-BUILDERS' DICTIONARY.

REVISED EDITION PUBLISHED DECEMBER, 1884.

THE NATIONAL CAR-BUILDER,
MORSE BUILDING, NEW YORK.

Norfolk & Ocean View R. R. & Hotel Co.
3 g. 8 m. 2 lo. 9 cars.
W. H. Taylor, Pres....Norfolk, Va.
Norfolk & Va. Beach R. R. 3 g. 18 m.
J. M. Dickey, Gen. Man....Norfolk, Va.
Norfolk & Western R. R. 5 g. 486 m. 82 lo. 1,779 c.
Jos. H. Sands, Gen. Supt....Roanoke, Va.
S. B. Hauot, Supt. M. Power....Roanoke, Va.
East Div.: N. M. Osborne, Supt....Norfolk, Va.
West Div.: Frank Huger, Supt..Lynchburg, Va.
North-Eastern R. R. of Ga. 5 g. 72 m. 2 lo. 20 cars.
H. R. Bernard, Supt....Athens, Ga.
North-Eastern R. R. (S. C.) (See Wil. & W'n.)
North Pacific Coast R. R. 3 g. 84 m. 12 lo. 320 cars.
Gen. Supt....San Rafael, Cal.
W. F. Russell, Pur. Agt....San Francisco, Cal.
E. L. Reese, M. M....Saucelito, Cal.
North Shore Ry. (See Canadian Pacific.)
Northern (N. H.), and Concord & Claremont Rys. (See Boston & Lowell.)
Northern (N. J.) R. R. (See N. Y., L. E. & W'n.)
Northern Central Ry. (See Penna. R. R. (6) Div.)
North'n Pacific R. R. 4-8½ g. 2,646 m. 391 lo. 9,897 c.
T. F. Oakes, Gen. Man....St. Paul, Minn.
John H. Ames, Gen. Pur. Agt..St. Paul, Minn.
Geo. W. Cushing, Supt. M. P., M. & R. S. do.
J. C. Barber, M. C. B....Brainerd, Minn.
(1) E'n Div.: J. T. Odell, A. Gen. Man. St. Paul, Minn.
1st Gr. Div.: M. C. Kimberly, Supt. Brainerd, Minn.
H. J. Small, M. M....Brainerd, Minn.
M. C. B....Brainerd, Minn.
2d Gr. Div.: J. M. Graham, Supt. Jamestown, Dak.
C. C. Quinn, M. M....Fargo, Dak.
A. Bardsley, M. M....Mandan, Dak.
F. Greene, A. Supt....Mandan, Dak.
3d Gr. Div.: S. R. Ainslie, Supt..Glendive, Mont.
S. L. Bean, M. M....Glendive, Mont.
C. W. Rossiter, M. M....Livingston, Mont.
(2) W'n Div.: J. M. Buckley, Asst. Gen. Man. New Tacoma, W. T.
W. T. Small, A. S. Mach....Tacoma, W. T.
4th Gr. Div.: F. W. Gilbert, Supt. Missoula, Mont.
F. P. Weymouth, Supt....Sprague, W. T.
Wm. Garlock, M. M....Missoula, Mont.
J. Evans, M. M....Sprague, W. T.
5th Gr. Div.: Otis Sprague, Supt...Tacoma, W. T.
Northern & North-W'n Rys. 4-8½ g. 378 m. 50 lo. 1,195 c.
James Webster, Supt....Toronto, Can.
W. C. Schreber, Pur. Agt....Allandale, Can.
P. Clarke, M. M....Toronto, Can.
Northern & Western Ry. 4-8½ g. 50 m.
J. B. Snowball, Man....Chatham, N. B.
Nova Scotia Ry. 4-8½ g. 79 m. 9 lo. 268 c.
C. A. Scott, Gen. Man....New Glasgow, N. S.
M. F. Punch, M. M....New Glasgow, N. S.

O

Ogdensburg & Lake Champlain R. R.
4-8½ g. 130 m. 33 lo. 1,694 cars.
A. A. Gaddis, Gen. Man....Ogdensburg, N. Y.
E. B. Burnham, Pur. Agt...Ogdensburg, N. Y.
Wm. A. Short, M. M....Malone, N. Y.
H. S. Leach, Master Builder. Ogdensburg, N. Y.
Ohio River R. R. 4-9 g. 9 lo. 350 cars.
C. L. Williams, Asst. Supt. Parkersburg, W. Va.
S. Litchworth, M. M....Parkersburg, W. Va.
Ohio Southern R. R.:
W. H. Van Tassel, Supt....Springfield, O.
John King, M. M....Springfield, O.
Ohio & Mississippi Ry. 4-9 g. 616 m. 113 lo. 2,501 cars.
W. W. Peabody, Pres. & Gen. Man. Cincinnati, O.
G. E. Atwood, Pur. Agt....Cincinnati, O.
F. W. Stapf, Gen. M. M....Vincennes, Ind.
Cin. Div.: C. B. Cole, Supt....Seymour, Ind.
J. P. Coulter, Gen. M. C. B....Aurora, Ind.
E. E. Jenks, A. Gen. For....Seymour, Ind.
W. L. Hoffecker, Ass't M. M. Vincennes, Ind.
A. N. Bradley, M. C. P....Cochran, Ind.
St. L. & Sp. Div.: C. M. Stanton, Supt. St. Louis, Mo.
J. W. Stokes, M. M. (Spring. Div.)..Pana, Ill.
Louisv. Div.: C. B. Cole, Supt....Louisville, Ky.
Old Colony R. R. 4-8½ g. 470 m. 124 lo. 3,527 cars.
J. R. Kendrick, Gen. Man....Boston, Mass.
R. W. Husted, Pur. Agt....Boston, Mass.
Jas. N. Lauder, Supt. R. S....Boston, Mass.
Sam. Stevens, S. Br. & Bld'gs....Boston, Mass.
Main Li. Div.: J. H. French, Supt...Boston, Mass.
F. M. Twombly, M. M....Boston, Mass.
Cape Cod Div.: C. H. Nye, Supt..Hyannis, Mass.
F. M. Twombly, M. M....Boston, Mass.
No. Div.: I. N. Marshall, Supt...Fitchburg, Mass.
A. W. Twombly, M. M....Taunton, Mass.
Olympia & Chehalis Val. R. R. 3 g. 15 m.
Otis Sprague, Supt....Olympia, W. T.
Oregon Ry. & Navigation Co.
3 & 4-8½ g. 807 m. 72 lo. 1,611 cars.
C. H. Prescott, V. P. & Gen. Man. Portland, Ore.
F. T. Dodge, Supt. (Riv. Div.)....Portland, Ore.
H. S. Rowe, Supt. (Ry Div.)....Portland, Ore.
J. M. Drake, Pur. Agt....Portland, Ore.
Goodall, Perkins & Co., Supt. (Ocean Div.) San Francisco, Cal.
C. C. Hobart, Gen. M. M....The Dalles, Ore.
P. Carlsen, Foreman....The Dalles, Ore.
Oregon & California R. R. 4-8½ g. 449 m. 43 lo. 626 c.
R. Koehler, Man....Portland, Ore.
J. Brandt, Gen. Supt....Portland, Ore.
W. T. Bodley, Pur. Agt....Portland, Ore.
A. Brandt, M. M....Portland, Ore.
Ottumwa & Kirkville Ry. 4-8½ g. 13 m.
J. A. Kebler, Supt....Ottumwa, Ia.
Owensboro & Nashville R. R. 5 g. 44 m. 3 lo. 70 c.
W. M. Newbold, Supt....Owensboro, Ky.
J. T. Edwards, M. M. & C. B..Owensboro, Ky.
Oxford & Henderson R. R. 4-8½ g. 13 m. 2 lo. 11 c.
James A. White, Gen. Supt...Henderson, N. C.
James E. Lawrence, M. M...Henderson, N. C.

P

Pacific Coast Ry. 3 g. 64 m.
J. M. Fillmore, Manager. San Luis Obispo, Cal.
John Walch, M. M. & C. B. do.
Painesville & Youngstown Ry. 3 g. 65 m. 7 lo. 319 c.
R. K. Paige, Rec. & Man....Painesville, O.
J. A. Newcome, Supt. R. S....Painesville, O.
Panama R. R. 5 g. 48 m. 14 lo. 2,200 cars.
G. A. Burt, Gen. Supt....Aspinwall, U. S. Col.
E. Z. Penfield, Pur. Agt....New York, N. Y.
Jos. Beaumont, M. M....Aspinwall, U. S. Col.
Passumpsic R. R. 4-8½ g. 147 m. 28 lo. 1,101 cars.
E. Raymond, Pres. & Pur. Agt..Boston, Mass.
H. E. Folsom, Supt....Lyndonville, Vt.
L. L. Brigham, M. M....Lyndonville, Vt.
L. F. Woodard, M. C. B....Lyndonville, Vt.
Paw Paw and Toledo & South Haven R. Rds.
3 g. 20 m. 3 lo. 16 cars.
John Ihling, Supt....Lawton, Mich.
Peach Bottom R. R. 3 g. 55 m. 6 lo. 52 cars.
B. B. Newton, Supt. & Pur. Agt...Oxford, Pa.
E. H. Williams, M. C. B....York, Pa.
W. P. Kirk, M. M....Oxford, Pa.
Pemigewasset Valley R. R. 4-8½ g. 21 m. 2 lo. 127 c.
J. Thomas Vose, Pres....Boston, Mass.
Pennsylvania Co.'s (5) Roads
4-9 g. 3,222 m. 920 lo. 32,809 cars.
Gen. Divs. (1), (2), (3), (4) and (5).
James McCrea, Gen. Man....Pittsburgh, Pa.
Wm. A. Baldwin, Manager....Pittsburgh, Pa.
Wm. Mullins, Gen. Pur. Agt....Pittsburgh, Pa.
Joseph Wood, Supt. M. P....Fort Wayne, Ind.
(1) Pittsburgh, Ft. Wayne & Chicago Ry.
4-9 g. 468 m. 288 lo. 8,023 cars.
E'n Div.: A. B. Starr, Supt....Allegheny, Pa.
Geo. J. Parkin, M. M....Allegheny, Pa.
D. M. Peppard, M. M....Crestline, O.
W'n Div.: C. D. Law, Supt....Ft. Wayne, Ind.
F. D. Casanave, M. M....Ft. Wayne, Ind.
A. H. Somers, Gen. For. Shops...Chicago, Ill.
(2) Ashtabula & Pittsburgh, and
(3) Erie & Pittsburg R. Rds. 221 m. 29 lo. 1,362 c.
John M. Kimball, Supt..Lawrence Junc., Pa.
J. A. Wood, Gen. For. Shops....Erie, Pa.
(4) Cleveland & Pittsb'g R. R. 225 m. 97 lo. 3,534 c.
R. F. Smith, Asst. Man....Cleveland, O.
John Thomas, Supt....Wellsville, O.
W. F. Beardsley, Mast. of Mach. Wellsville, O.
(5) No-W'n Ohio Ry.: J. S. Morris, Supt...Toledo, O.
Pennsylvania R. R. Co.'s Roads. (7 Gen. Divs.)
4-9 g. 3,158 m. 1,459 loco. 66,816 cars.
Chas. E. Pugh, Gen. Man....Philadelphia, Pa.
Enoch Lewis, Pur. Agt....Philadelphia, Pa.
S. M. Provost, Supt. Trans...Philadelphia, Pa.
Theo. N. Ely, Gen. S. M. P....Altoona, Pa.
Pennsylvania R. R. Divs.
4-9 g. 1,213 m. 705 lo. 46,819 cars.
Robt. E. Pettit, Gen. Supt....Altoona, Pa.
Frank L. Sheppard, Supt. M. P..Altoona, Pa.
G. W. Strattan, M. M....Altoona, Pa.
Jno. P. Levan, Gen. Fore....Altoona, Pa.
Phila. Div.: Tho. Gucker, Supt. Philadelphia, Pa.
H. D. Garrett, M. M....W. Philadelphia, Pa.
I. W. Van Houten, Gen. For....W. Phila., Pa.
Schuylkill Div.:
Jas. Reed, Supt....Reading, Pa.
Mid. Div.: O. E. McClellan, Supt. Harrisburg, Pa.
E. L. Caum, M. M....Harrisburg, Pa.
Samuel W. Myers, Gen. For. Harrisburg, Pa.
Altoona Div.: J. B. Hutchinson, Supt. Altoona, Pa.
Pitts. Div.: Robert Pitcairn, Supt..Pittsburgh, Pa.
D. O. Shaver, M. M....Pittsburgh, Pa.
J. G. Stewart, Gen. For....Pittsburgh, Pa.
W. Pa. Div.: A. P. Kirtland, Supt. Blairsville, Pa.
Wm. B. Norris, M. M....Blairsville, Pa.
M. H. Fails, Gen. For....Blairsville, Pa.
Fred. Div.: Wilson Brown, Supt....York, Pa.
Tyrone Div.: S. S. Blair, Supt....Tyrone, Pa.
Lew. Div.: Wm. M. Phillips, Supt. Lewistown, Pa.
Bed. Div.: R. L. Holliday, Supt....Bedford, Pa.
Monong. Div.: David M. Watt, Supt. Pittsburgh, Pa.
Wm. Lininger, M. M....Ormsby, Pa.
(2) United R. Rs. of N. J. Divs. 471 m. 330 lo. 4,041 c.
F. Wolcott Jackson, Gen. St..Jersey City, N. J.
H. S. Hayward, Supt. M. P...Jersey City, N. J.
David H. Baker, Gen. For...Jersey City, N. J.
N. Y. Div.: Jos. A. Crawford, Supt. Jersey City, N. J.
L. A. Bosdevex, M. M....Jersey City, N. J.
E. F. Bosdevex, Gen. For..Jersey City, N. J.
Belv. Div.: J. A. Anderson, Supt. Lambertv., N. J.
R. McDowell, M. M....Lambertville, N. J.
Amboy Div.: W. N. Bannard, Supt. Camden, N. J.
Thos. Kerr, M. M....So. Amboy, N. J.
P. S. Bogart, Gen. For....So. Amboy, N. J.
(2½) Camden & At. Rd.: 75 m. 18 l. 261 c.
A. G. Dayton, Supt....Camden, N. J.
Rufus Hill, M. M....Camden, N. J.
Samuel Wills, M. C. B....Camden, N. J.
(3) West Jersey R. R. 4-9 g. 188 m. 27 lo. 294 cars.
A. G. Dayton, Gen. Supt....Camden, N. J.
W. McAlister, M. M....Camden, N. J.
C. C. Williams, Gen. For....Camden, N. J.
(4) Phila., Wilm. & Balt. R.R. 409 m. 128 lo. 1,882 c.
H. F. Kenney, Gen. Supt....Philadelphia, Pa.
J. M. Wallis, S. M. P....Philadelphia, Pa.
H. D. Gordon, M. M....Wilmington, Del.
W. H. Lungren, M. C. B....Wilmington, Del.
Cen. Div.: L. K. Lodge, Supt....Media, Pa.
Del. Div.: I. N. Mills, Supt....Clayton, Del.
Ma. Div.: H. H. Carter, Supt..Wilmington, Del.
(5) Phila. & Erie R. R. Divs.: 437 m. 110 lo. 3,089 c.
R. Neilson, Gen. Supt....Williamsport, Pa.
Edw. D. Nelson, Supt. Mo. Po. Williamsport, Pa.
E'n. Div.: E. B. Westfall, Supt. Williamsport, Pa.
Sun. H. & W. Div.: A. Walter, Supt.; and
H. K. Stout, M. M....Sunbury, Pa.
Mid. Div.: Tho. A. Roberts, Supt....Renovo, Pa.
Wm. L. Holman, M. M....Renovo, Pa.
West'n Div.: J. W. Reynolds, Supt....Erie, Pa.
J. Gaskill, M. M....Erie, Pa.
(6) Northern Central Ry. 4-9 g. 346 m. 152 lo. 6,610 c.
Robert Neilson, Gen. Supt...Williamsport, Pa.
Edw. D. Nelson, Supt. M. P..Williamsport, Pa.
A. W. Sumner, Pur. Agt....Baltimore, Md.
J. M. Coale, M. M....Baltimore, Md.
G. W. Demarest, Gen. For..Baltimore, Md.
Susq. Div.: E. B. Westfall, Supt. Williamsport, Pa.
Sham. Div.: A. Walter, Supt....Sunbury, Pa.
Elm. & Can. Divs.: S. Meade, Supt..Elmira, N. Y.
Jas. Strode, M. M....Elmira, N. Y.
J. C. Dyott, Gen. For....Elmira, N. Y.
Sodus Bay Div.: S. Mead, Supt. Sodus Point, N. Y.
Baltimore Div.: H. W. Kapp, Supt. Baltimore, Md.
(7) Balt. & Pot. & Alex. & Fred. 125 m. 30 lo. 360 c.
H. F. Kenny, Gen. Supt....Philadelphia, Pa.
A. W. Sumner, Pur. Agt....Baltimore, Md.
J. M. Wallis, Supt. Mo. Po....Philadelphia, Pa.
H. D. Gordon, M. M....Wilmington, Del.
J. Lescallett, For. Mach. Shop. Washington, D. C.
R. F. Downs, For. Car Shop..Washington, D. C.
Penn. Coal Co.'s R. R. 4-3 g. 67 m. 23 eng. 3,271 c.
J. B. Smith, Gen. Supt....Dunmore, Pa.
And. Crane, M. M....Dunmore, Pa.
Geo. W. Simpson, M. C. B....Dunmore, Pa.
Pennsylvania, Slatington & New England R. R.
In progress. 4-8½ g. 18 m. 1 lo. 20 cars.
C. H. Stanton, Supt....New York, N. Y.
Pennsylvania & Erie R. R.—Early Branch.
C. R. Early, Gen. Supt....Ridgeway, Pa.
Pensacola & Atlantic R. R. 5 g. 161 m. 9 lo. 67 cars.
E. O. Saltmarsh, Gen. Supt....Pensacola, Fla.
W. D. Robb, M. M....Pensacola, Fla.
Pensacola & Perdido R. R. 5 g. 10 m. 5 lo. 92 cars.
B. F. Simmons, Pr. & Supt....Pensacola, Fla.
H. W. Simmons, Pur. Agt....Pensacola, Fla.
J. C. Schutte, M. M....Pensacola, Fla.
People's Ry. 4-8½ g. 15 m. 2 lo. 14 cars.
W. D. Pollard, Supt....Pottsville, Pa.
Peoria, Decatur & Evansville Ry.
4-8½ g. 254 m. 30 lo. 1,660 cars.
G. L. Bradbury, Gen. Man....Peoria, Ill.
P. Reilly, M. M....Mattoon, Ill.
Peoria & Farmington R. R. (See Cen. Ia.)
Peoria & Pekin Union Ry. 4-8½ g. 20 m. 12 lo. 106 c.
Thos. B. Burnett, Gen. Supt. & P. A. Peoria, Ill.
O. W. Bell, Supt....Peoria, Ill.
R. F. Hurd, M. M. & C. B....Peoria, Ill.
Perkiomen R. R. 4-8½ gauge 39 miles.
D. B. Clack, Supt....Perkiomen Junction, Pa.
H. Boyd, Pur. Agt....Norristown, Pa.
Petersburg R. R. 4-8½ g. 64 m. 10 lo. 133 cars.
R. M. Sully, Supt....Petersburg, Va.
Geo. F. Jones, Pur. Agt....Petersburg, Va.
J. R. Woodard, M. M....Petersburg, Va.
Phila., Wilmington & Balt. R. R. (See Penna. R. R.)
Peterborough & Hillsborough. (See Northern, N. H.)
Philadelphia, Newtown & N. Y. R. R. 4-8½ g. 23 m.
W. M. Geary, Supt....Philadelphia, Pa.
Phila. & Atlantic City R. R. 4-8½ g. 54 m.
John E. Wootten, Gen. Man. Philadelphia, Pa.
W. Bertolet, Supt....Philadelphia, Pa.
W. S. Wilson, Pur. Agt....Philadelphia, Pa.
Philadelphia & Erie R. R. (See Penna. R. R.; (5) Div.)
Philadelphia & Reading R. R.
4-8½ g. 1,588 m. 940 lo. 57,477 cars.
John E. Wootten, Gen. Man..Philadelphia, Pa.
W. S. Wilson, Pur. Agt....Philadelphia, Pa.
Geo. Eltz, Supt. Trans....Reading, Pa.
L. B. Paxson, Eng. of Mach....Reading, Pa.
No. Penn. & Bound Brook Div.:
I. A. Sweigard, Supt....Philadelphia, Pa.
Mahanoy & Susquehanna Div.:
J. H. Olhausen, Supt....Palo Alto, Pa.
D. C. Reinhart, Asst. Supt....Catawissa, Pa.
A. A. Hesser, Asst. Supt. Mahanoy Plane, Pa.
Schuylkill & Susquehanna Br.:
H. W. Tracy, Supt....Pine Grove, Pa.
Reading & Columbia R. R.:
A. M. Wilson, Supt....Columbia, Pa.
N. J. Central and N. J. Southern Divs.:
W. W. Stearns, Supt....Elizabeth, N. J.
Lehigh & Susquehanna Div.:
G. W. Twining, Supt....Mauch Chunk, Pa.
Pittsburgh, Bradford & Buffalo Ry. (See Pitts. & West.)
Pittsburgh, Chartiers & Youghiogheny R. R.
4-8½ g. 19 m.
Geo. S. Griscom, Gen. Man....Pittsburgh, Pa.
Pittsburgh, Cincinnati & St. Louis Ry. (5 Gen. Divs.)
4-9 g. 916 m. 239 lo. 7,133 cars.
James McCrea, Gen. Man....Pittsburgh, Pa.
John F. Miller, Gen. Supt....Columbus, O.
Wm. Mullins, Pur. Agt....Pittsburgh, Pa.
Edward B. Wall, Supt. M. P....Columbus, O.
Robt. Curtis, M. M....Columbus, O.
(1) P., C. & St. L. Div.: E. B. Taylor, Supt. Pittsburgh, Pa.
C. B. Street, M. M....Dennison, O.
J. M. Copeland, G. F. Car Shops. Steubenville, O.
(2) C. & M. V. Div.: W. F. Black, Supt..Zanesville, O.
Leroy Kells, M. M....Lancaster, O.
Wm. Meikle, Gen. For....Lancaster, O.
Daniel Jewell, Gen. F. Car Shops. Lancaster, O.
(3) Li. Mi. Div.: Ralph Peters, Supt....Cincinnati, O.
Leroy Kells, M. M....Cincinnati, O.
Jos. Underwood, G. F. Car Shops. Cincinnati, O.
(4) J. M. & I. R. R.: E. W. McKenna, Supt. Louisville, Ky.
Wm. Swanston, M. M....Indianapolis, Ind.
Edw. Austin, G. F. C. Shops..Indianapolis, Ind.
(5) Indianapolis & Vincennes R. R.
M. W. Mansfield, Supt....Indianapolis, Ind.
Pittsburgh, Cleveland & Toledo R. R.
4-8½ g. 78 m. 18 lo. 525 cars.
C. H. Andrews, Pres....Youngstown, O.
W. F. Hofecker, M. M....Youngstown, O.
Pittsburgh, Ft. Wayne & Chicago Ry. (See Penna. Co.)
Pittsburgh Southern Ry. (See Balt. & O.)
Pitts. & Castle Shannon R. R. 3-4 g. 9 m. 5 lo. 428 c.
Gen. Supt....Pittsburgh, Pa.
Holmes Ward, M. M....Castle Shannon, Pa.
Wm. E. Long, M. C. B....Pittsburgh, Pa.
Pitts. & Lake Erie R. R. 4-8½ g. 70 m. 30 lo. 1,528 c.
W. C. Quincy, Gen. Man....Pittsburgh, Pa.
D. H. Hostetter, Pur. Agt....Pittsburgh, Pa.
R. W. Jones, Mast. Trans....Pittsburgh, Pa.
S. W. Haines, M. M....Pittsburgh, Pa.
Pittsburgh, McKeesport & Youghiogheny.
4-8½ g. 57 m. 19 lo. 278 cars.
W. C. Quincy, Gen. Man....Pittsburgh, Pa.
R. W. Jones, M. of Trans....Pittsburgh, Pa.
S. W. Haines, M. M....Pittsburgh, Pa.
Pitts. & Western R. R. 3 & 4-8½ g. 274 m. 50 lo. 1,407 c.
Pitts., Bradford & Buff. Ry. 3 g. 93 m. 8 lo. 163 c.
Tho. M. King, Gen. Man....Allegheny, Pa.
J. T. Johnson, Supt....Allegheny, Pa.
J. Morton Hall, Pur. Agt....Allegheny, Pa.
W. M. Flahavhan, M. M....Allegheny, Pa.
Pontiac, Oxford & Pt. Austin R. R. 100 m.
Geo. W. Debevoise, Pr. & Gen. Man. N. York, N. Y.
Jas. Houston, Gen. Supt....Pontiac, Mich.
Port Huron & No.-Western Ry. 3 g. 218 m. 14 lo. 288 c.
H. McMorran, G. Man. & P. A. Port Huron, Mich.
I. R. Wadsworth, Supt....Port Huron, Mich.
Chas. Diefenbach, M. M....Port Huron, Mich.
Benj. Hillier, M. C. B....Port Huron, Mich.
Port Jervis & Monticello R. R. 4-8½ g. 24 m. 3 lo. 13 c.
J. M. Warner, Gen. Man....Port Jervis, N. Y.
Port Royal & Augusta. 5 g. 180 m. 16 lo. 310 c.
and Augusta & Knoxville Rys.
J. N. Bass, Supt....Augusta, Ga.
T. F. Warwick, M. M. & M. C. B. Augusta, Ga.
Portland & Ogdensburg. 4-8½ g. 110 m. 11 lo. 311 c.
J. Hamilton, Gen. Supt. & P. A...Portland, Me.
M. M....Portland, Me.
W. G. Brewer, M. C. B....Portland, Me.
Portland & Rochester R. R. 4-8½ g. 52 m. 8 lo. 226 c.
J. W. Peters, Supt. & Pur. Agt...Portland, Me.
E. H. C. Tompson, For. of Mach..Portland, Me.
David Dow, For. of Car Repairs. Portland, Me.
Potomac, Fred.'g & Pied. R. R. 3 g. 38 m. 2 lo. 38 c.
W. H. Richards, Gen. Man. Fredericksburg, Va.
W. J. Sweigard, M. M....Fredericksburg, Va.
Pough., Hart. & Bos. R. R. 4-8½ g. 45 m. 4 lo. 65 c.
J. A. Perkins, Supt....Poughkeepsie, N. Y.
John L. Donaldson, M. M. Poughkeepsie, N. Y.
Pratt Coal & Iron Company's R.R. 5 g. 20 m. 4 lo. 184 c.
W. L. Gude, Gen. Man....Pratt Mines, Ala.
Prescott & Thirty-Fifth Parallel R. R.
4-8½ g. 77 miles in progress.
Samuel A. Henszey, Gen. Man..Prescott, Ariz.
Prince Edward Island Ry. 3-6 g. 220 m. 21 lo. 350 c.
Jas. Coleman, Supt. & Pur. Agt.;
Jos. Unsworth, M. Supt. & Storekeeper; and
D. M. Fraser, M. C. B....Charlottetown, P. E. I.
Profile & Franconia Notch R. R. 3 g. 15 m. 3 lo. 18 c.
Emmons Raymond, Pur. Agt....Boston, Mass.
C. H. Greenleaf, Supt....Profile House, N. H.
Prospect Park & Coney Island R. R.
4-8½ g. 15 m. 8 lo. 123 cars.
And. R. Culver, Pres....Brooklyn, N. Y.
R. Schermerhorn, Supt....Brooklyn, N. Y.
Martin Painter, M. M....Brooklyn, N. Y.
Prov., Warren & Bristol R. R. 4-8½ g. 19 m. 6 lo. 79 c.
Waterman Stone, Supt....Providence, R. I.
Rufus Smith, M. M. & C. B....Bristol, R. I.
Prov. & Springfield R. R. 4-8½ g. 23 m. 4 lo. 92 c.
Wm. Tinkham, Gen. Man....Providence, R. I.
G. T. Richardson, M. M....Providence, R. I.
Prov. & Worcester. 4-8½ g. 50 m. 37 lo. 1,253 c.
W. E. Chamberlain, Supt....Providence, R. I.
A. Griggs, Supt. L. & C. D....Providence, R. I.
Pullman's Palace Car Co. 1,100 passenger cars.
Geo. M. Pullman, Pres....Chicago, Ill.
H. Porter, V. Pres....New York, N. Y.
Geo. F. Brown, Gen. Man....Chicago, Ill.
Wm. A. Angell, Pur. Agt....Chicago, Ill.
S. W. Bretzfield, Asst. Pur. Agt. New York, N. Y.
A. Rapp, Man. (Chicago Works)..Chicago, Ill.
H. L. Spaulding, Man. (Det. Shops). Detroit, Mich.
E. A. Benson, Supt. Shops....St. Louis, Mo.

Q

Quebec Central Ry. 4-8½ g. 156 m. 10 lo. 267 cars.
J. R. Woodward, Gen. Man..Sherbrooke, P. Q.
A. Steele, Supt....Sherbrooke, Que.
R. D. Morkill, Jr., Pur. Agt..Sherbrooke, P. Q.
Jas. Selveright, M. M....Sherbrooke, P. Q.
Quebec, Montreal, Ottawa & Occidental Ry.
4-8½ g. 354 m. 36 lo. 993 cars.
L. A. Senecal, Gen. Supt....Quebec, Can.
Quebec & Lake St. John Ry. 4-8½ g. 36 m. 3 lo. 55 c.
J. G. Scott, Manager....Quebec, Can.
Frank Fournier, Supt....St. Raymond, P. Q.
John T. Eames, M. M....St. Raymond, P. Q.

R

Raleigh & Augusta Air-Line: Carolina Central Raleigh & Gaston R. Rs. 4-8½ g. 446 m. 52 lo. 1,052 c.
John C. Winder, Gen. Man. & P. A. Raleigh, N. C.
Raleigh Rds. 4-8½ g. 200 m. 27 lo. 638 cars.
B. R. Harding, Supt. of Mach. Raleigh, N. C.
Carolina Cen. R. R. 4-8½ g. 242 m. 26 lo. 431 c.
L. C. Jones, Supt....Wilmington, N. C.
James Maglenn, M. of Mach. Laurinburg, N. C.
S. R. Ethridge, M. C. B....Laurinburg, N. C.
Rhinebeck & Connecticut. (See Hart. & Ct. Wn.)
Richmond, Fredericksburg & Potomac R. R.
4-9 g. 81 m. 15 lo. 149 cars.
E. T. D. Myers, Gen. Supt....Richmond, Va.
T. L. Courtney, Asst. Supt....Richmond, Va.
H. Kuhn, M. M....Richmond, Va.
W. H. Trainham, M. C. B....Richmond, Va.
Rich., York River & Ches. R. R. (See Rich. & Dan.)
Richmond & Alleghany R.R. 4-9 g. 261 m. 19 lo. 837 c.
Decatur Axtell, Rec. & Gen. Man. Richmond, Va.
M. Sweeney, Pur. Agt....Richmond, Va.
Geo. D. Harris, M. M. & C. B....Richmond, Va.
Richmond & Danville R. R. Co.'s Roads.
1,736 miles 218 loco. 3,833 cars.
E. B. Thomas, 2d V. P. & G. Man. Richmond, Va.
Peyton Randolph, As. G. Man..Richmond, Va.
J. P. Minetree, Pur. Agt....Richmond, Va.
R. D. Wade, Supt. Mo. Po....Richmond, Va.
(1) Rich. & Dan. R. R. 5 g. 847 m. 131 lo. 2,687 cars.
Rich. & Dan. Div.: 5 g. 320 m. 80 lo. 1,797 c.
Wm. H. Green, Supt....Richmond, Va.
M. M....Richmond, Va.
J. B. Vaughan, For. Car Sh...Richmond, Va.
North Carolina Div. 5 g. 223 m. 22 lo. 268 cars.
A. B. Andrews, Supt....Raleigh, N. C.
W. H. Turrentine, M. M. Comp'y's Shops, N. C.
J. C. Holt, For. Car Sh. Comp'y's Shop, N. C.
Atlanta & Char. Air Line. 5 g. 286 m. 31 lo. 415 c.
Narrow-Gauge Branches. 3 g. 80 m. 5 lo. 41 c.
Edmund Berkley, Supt....Atlanta, Ga.
T. W. Gentry, M. M....Atlanta, Ga.
Z. T. Smith, For. Car Sh....Atlanta, Ga.
(2) Charlotte, Col. & Aug. R. R. 5 g. 239 m. 22 lo. 287 c.
G. R. Talcott, Supt....Columbia, S. C.
J. H. Green, M. M. (2 roads)..Columbia, S. C.
(3) Columbia & Greenville R. R. 5 g. 297 m. 22 l. 224 c.
G. S. Talcott, Supt....Columbia, S. C.
J. O. Meredith, For. E. & C. Rep. do.
(4) Virginia Midland Ry. 4-8½ g. 353 m. 41 lo. 631 c.
Supt. Alexandria, Va.
H. M. Smith, M. of M....Alexandria, Va.
J. T. Nalls, M. C. B....Alexandria, Va.
Richmond & Petersburg R. R. 4-8½ g. 25 m. 8 lo. 132 c.
J. R. Kenly, Supt....Richmond, Va.
John O'Brien, M. M....Richmond, Va.
Rio Grande R. R. 3-6 g. 22 m. 3 lo. 40 cars.
M. J. Gomila, Rec. & Gen. Man. Brownsville, Tex.
G. W. Rendall, M. M....Brownsville, Tex.
M. Markwood, M. C. B....Brownsville, Tex.
Rio Grande & Pecos Ry. 4-8½ g. 27 m. In progress.
W. W. Hungerford, Man....Laredo, Tex.
Rochester & Lake Ontario Ry. 4-8½ g. 6 m. 2 lo. 10 c.
N. B. Ellison, Man....Rochester, N. Y.
Rochester & Pittsb'g R.R. 4-8½ g. 260 m. 60 lo. 3,296 c.
Geo. E. Merchant, Gen. Man...Rochester, N. Y.
J. T. Gardiner, Gen. Supt....Buffalo, N. Y.
C. W. Mills, Supt. M. P....Rochester, N. Y.
Rock Island & Mercer County R. R., and
Rock I'd & Peoria Ry. 4-8½ g. 113 m. 13 lo. 357 c.
R. R. Cable, V.-P. & Gen. Supt....Chicago, Ill.
R. I. & P. Ry.:
H. B. Sudlow, Supt. & P. A....Rock Island, Ill.
Joseph Elder, M. M....Peoria, Ill.
R. I. & M. C. Rd.: H. B. Sudlow, Supt. R'k Island, Ill.
J. H. Parks, M. M....Rock Island, Ill.
Rogersville & Jefferson R. R. 5 g. 16 m. 1 lo. 6 cars.
C. M. Leuty, Supt....Rogersville, Tenn.
Rome (Ga.) R. R. 5 g. 20 m. 2 lo. 17 cars.
Eben Hillyer, Pres. & Supt....Rome, Ga.
O. W. Harbin, M. M....Rome, Ga.
Rome, Watertown & Ogdensburg R. R.
4-8½ g. 418 m. 61 lo. 1,831 cars.
H. M. Britton, Gen. Man. & P. A. Oswego, N. Y.
Geo. H. Haselton, S. M. P. & M..Oswego, N. Y.
E'n Div.: J. D. Remington, A. Supt. Watertown, N. Y.
W'n Div.: W. H. Chauncey, A. Supt. Oswego, N. Y.
Roodhouse & Scottsville Ry. In progress.
Geo. P. Merrill, Gen. Man....Chicago, Ill.
Rumford Falls & Buckfield R.R. 4-8½ g. 29 m. 2 l. 62 c.
L. L. Lincoln, Supt. & Pur. Agt...Canton, Me.

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Sabine & East Texas Ry. (See Cen. Pac.)
Sacramento & Placerville R. R. (See Cen. Pac.)
Saginaw Bay & Northw'n R.R. 4-8½ g. 31 m. 6 lo. 136 c.
J. Jackson, Gen. Man....Pinconning, Mich.
F. T. Lillote, Act. Pur. Agt...Pinconning, Mich.
Edward Keeler, M. M....Pinconning, Mich.
Saginaw, Tuscola & Huron R. R.
3 g. 50 m. 5 lo. 85 cars.
M. B. Wilkinson, Gen. Supt..E. Saginaw, Mich.
Saginaw Valley & St. Louis R. R. 4-8½ g. 39 m. 4 l. 64 c.
T. M. Fish, Gen. Supt....Ionia, Mich.
N. W. Merrill, Div. Supt....Saginaw, Mich.
Allan Bourn, Pur. Agt....Detroit, Mich.
Geo. C. Watrous, S. M. P. & R. S..Ionia, Mich.
Salt Lake & Western R. R. (See Un. Pac.; (6) Div.)
San Francisco & No. Pac. 4-8½ g. 139 m. 11 lo. 245 c.
Arthur Hughes, Gen. Man..San Francisco, Cal.
H. C. Whiting, Supt....San Rafael, Cal.
Ed. Reynolds, Gen. M. M....Donahue, Cal.
Ed. Reynolds, M. C. B....Donahue, Cal.
Sanborn, Cooperstown & Turtle M. R. R. In progress.
C. A. Roberts, Gen. Man....Sanborn, Dak.
Sandy River R. R. 2 g. 18 m. 3 lo. 36 cars.
N. B. Beal, Pres. & Supt....Phillips, Me.
M. Saunders, M. M. & C. B....Phillips, Me.
Sandusky, Mansfield & Newark R. R. (See B. & O.)
Sanford & Indian River R. R. (See So. Flor.)
San Luis Obispo & Santa Maria R. R.
3 g. 20 m. 2 lo. 30 cars.
Charles Goodall, Man....San Francisco, Cal.
San Pete Valley R. R. 3 g. 33 m. 2 lo. 57 cars.
S. Bamberger, Man....Salt Lake City, U. T.
J. E. Bamberger, Pur. Agt....Salt Lake, U. T.
B. Bates, M. M....Morvin, U. T.
Saratoga, Mt. McGregor & Lake George R. R.
3 g. 11 m. 3 lo. 12 cars.
John McGee, Supt....Saratoga Springs, N. Y.
Savannah, Florida & W'n Ry. 5 g. 519 m. 62 lo. 1,063 c.
H. S. Haines, Gen. Man....Savannah, Ga.
R. G. Fleming, Supt....Savannah, Ga.
A. A. Aveilhé, Pur. Agt....Savannah, Ga.
G. M. D. Riley, M. of Mach....Savannah, Ga.
E. Geffcken, For. Car Dept....Savannah, Ga.
Sav., Griffin & No. Ala. R. R. Op. by Central (Ga.).
Schuylkill & Lehigh R. R. (See Phil. & Read.)
Schoharie Valley R. R. (See Middleburg & Sch.
Scioto Valley R. R. 4-8½ g. 132 m. 19 lo. 548 cars.
Geo. Skinner, Supt. & P. Agt....Columbus, O.
R. Bromley, M. M....Portsmouth, O.
Seaboard & Roanoke R. R. 4-8½ g. 80 m. 21 lo. 384 c.
L. T. Myers, Supt....Portsmouth, Va.
J. A. Walton, Pur. Agt....Portsmouth, Va.
M. M. Pendleton, S. M. P. & M. Portsmouth, Va.
Sedalia, Warsaw & Southern Ry. (See Mo. Pac.)
Sharpsville R. R. 4-8½ g. 23 m. 3 lo. 13 cars.
Thos. M. King, V. P. & Gen. Man. Pittsburgh, Pa.
W. C. Agnew, Asst. Gen. Man..Youngstown, O.
Shelby Iron Co. R. R. 5-9 g. 7 m. 2 lo. / 3-6 g. 12 m. 3 lo. } 50 c.
J. A. McArthur, G. Man..Shelby Ir. Wks, Ala.
R. H. Stoughton, Supt..Shelby Iron Wks., Ala.
J. H. Burgbardt, M. M..Shelby Iron Wks, Ala.
Shell Beach R. R. 5 g. 22 m.
M. R. Spelman, Supt....New Orleans, La.
Shenandoah Valley R. R. 4-9 g. 249 m. 32 lo. 849 c.
D. W. Flickwir, Gen. Supt....Roanoke, Va.
W. C. De Armond, Pur. Agt...Philadelphia, Pa.
Supt. of M. P...Roanoke, Va.
W. A. Morgan, M. C. B....Lynchburg, Va.
J. T. Robinett, M. M....Petersburg, Va.
Shenango & Allegheny R.R. 4-8½ g. 74 m. 8 lo. 248 c.
J. T. Blair, G. Man. & Pur. Agt. Greenville, Pa.
Edw. Richardson, M. M. & C. B. Greenville, Pa.
Shepaug R. R. 4-8½ g. 38 m. 3 lo. 28 cars.
Edwin McNeill, Supt....Litchfield, Ct.
A. J. Broughet, M. M....Litchfield, Ct.
Ship Is., Ripley & Ky. R. R. 3 g. 25 m. 2 lo. 23 cars.
C. L. Harris, Supt. & Pur. Agt....Ripley, Miss.
W. H. Phelps, M. M....Ripley, Miss.
Silver City, Deming & Pacific R. R. 3 g. 47 m. 3 l. 141 c.
John W. Smith, Gen. Supt....Silver City, N. M.
Silver Lake Ry. 4-8½ g. 6 m. 1 lo. 4 cars.
C. W. S. Nobles, Supt....Perry, N. Y.
Sinaloa & Durango R. R. 4-8½ g. 39 m. 2 lo. 40 cars.
Geo. S. Skilton, Gen. S. Culiacan, Sinaloa, Mex.
John E. Bell, M. M....Culiacan, Mex.
Skaneateles R. R. 4-8½ g. 5 m. 2 lo. 5 cars.
J. McNamara, Supt....Skaneateles, N. Y.
Sioux City & Pacific R. R. 4-8½ g. 427 m. 31 lo. 893 c.
W. P. Linsley, Gen. Man....Missouri Valley, Ia.
C. M. Lawler, Gen. Supt....Missouri Valley, Ia.
R. W. Hamer, Pur. Agt....Chicago, Ill.
W. G. Brownson, Asst. Supt....Norfolk, Neb.
S. A. Teal, M. M....Missouri Valley, Ia.
W. H. Ramseyer, M. C. B...Missouri Valley, Ia.
Smyrna & Delaware Bay R. R. (See Kent County.
Sodus Bay Ry. (See Northern Central.
Somerset R. R. 4-8½ g. 25 m. 3 lo. 24 cars.
W. M. Ayer, Supt. & Pur. Agt....Oakland, Me.
S. P. Mosher, For. Car Rep....Oakland, Me.
C. Crowell, For. Lo. Rep's....No. Anson, Me.
Sonora Ry. (See A., T. & S. Fe.)
Sonoma Valley:
Arthur Hughes, Gen. Man. San Francisco, Cal.
H. C. Whiting, Supt....San Rafael, Cal.
J. T. Peters, Asst. Supt....Glen Ellen, Cal.
Ed. Reynolds, M. M....Donahue, Cal.
South & North Alabama R. R. (See Louis. & Nash.)
South Carolina Ry. 5 g. 246 m. 46 lo. 834 cars.
John B. Peck, Gen. Man....Charleston, S. C.
S. B. Pickens, Pur. Agt....Charleston, S. C.
P. J. Cochrane, Mast. of Mach. Charleston, S. C.
Geo. H. Gramling, M. C. B....Charleston, S. C.
South-Eastern Ry. 4-8½ g. 280 m. 30 lo. 1,000 cars.
T. A. McKinnon, Gen. Man....Montreal, Can.
Robt. McLoud, M. M....Farnham, P. Q.
South Florida R. R. 3 gauge 115 m. 13 lo. 250 cars.
B. R. Swoope, Supt. & P. A....Sanford, Fla.
R. Derby, M. M....Sanford, Fla.
A. B. Allen, M. C. B....Sanford, Fla.
South Mountain R. R. 4-8½ g. 18 m. 4 lo. 22 c.
W. H. Woodward, Supt. Pine G've Furnace, Pa.
South Pacific Coast R. R. 3 g. 81 m. 16 lo. 500 cars.
L. Fillmore, Gen. Supt....San Francisco, Cal.
W. H. Masterman, M. M. & C. B..Newark, Cal.
South-Western R. R. (Ga.) (See Central of Ga.)
South-Western Ry. (Ky.) 4-8½ g. 5 m. 1 lo. 28 cars.
M. Tabler, Supt. & Man....Harrodsburg, Ky.
J. C. Hool, Pur. Agt....Harrodsburg, Ky.
Southern Central R. R. 4-8½ g. 156 m. 21 lo. 467 c.
H. D. Titus, Gen. Supt. & P. A....Auburn, N. Y.
John White, M. M....Auburn, N. Y.
H. Mooney, M. C. B....Auburn, N. Y.
Southern Kansas Ry. (See At., Top. & Santa Fe.
Southern Maryland R. R. 4-8½ g. 20 m. 1 lo. 20

J. B. Ridgway, *Supt*..........Brandywine, Md.
C. R. Joyce, *M. M*..........Brandywine, Md
Southern Pacific R. R. 4-8½ g. 203 m. 335 lo. 780 c.
Northern Div. (*For other Divs. see Cen. Pac.*)
A. C. Bassett, *Supt*.......San Francisco, Cal.
J. R. Watson, *Pur. Agt*.....Sacramento, Cal.
J. T. Wilson, *M. M*.......San Francisco, Cal.
F. N. Bellisle, *M. C. B*. ...San Francisco, Cal.
Southern Pacific R. R. of Arizona. (*See Cen. Pac.*)
Southern Pacific R. R. of New Mexico. (*See Cen. Pac.*)
Spartanburg, Union & Columbia R. R.
(*See Rich. & Dan.*; (3) *Div.*)
Spring Brook R. R. 4-3 g. 8 m. 1 lo. 18 cars.
Charles Pugh, *Pres*..............Pittston, Pa.
Spring Hill & Parrsboro Ry. (*See Cumberland.*)
Springfield, Effingham & So.-E'n Ry. (*See Ind. & Ill.*)
Springville & Sardinia Ry. 4-8½ g. 12 m. 1 lo. 8 c.
Bertrand Chaffee, *Pres*.......Springville, N. Y.
St. Croix & Penobscot R. R. 4-8½ g. 22 m. 4 lo. 195 c.
S. W. Haycock, *Supt. & Pur. Agt*. .Calais, Me.
G. H. Corsen, *M. M*..............Milltown, Me
H. C. Tincker, *M. C. B*............Milltown, Me.
St. Helen, Houghton Lake & West. R. R. 4-8½ g. 13 m.
Z. C. Jessop, *Gen. Man*..........Detroit, Mich
St. John & Maine Ry. (*See New Brunswick.*)
St. John's Ry. 4-8½ g. 14½ m. 2 lo. 24 cars.
R. McLaughlin, *Pr. & Supt*. .Jacksonville, Fla.
J. M. Owens, *M. of Mach*....St. Augustine, Fla.
St. John's & Lake Eustis Ry. (*See Florida Southern.*)
St. Johnsb'ry & Lake Champ. 4-8½ g. 120 m 15 lo. 372 c
A. B. Jewett, *Supt. & P. A*..St. Johnsbury, Vt
Geo. E. Howe, *M. M. & C. B*. St. Johnsbury, Vt
St. Joseph Valley R. R. 3 g. 15 m. 1 lo. 11 cars
B. Helmick, *Gen. Man*.......Buchanan, Mich
St. Joseph & Des Loge Ry. 3 g. 13 m. 4 lo. 70 cars.
T. T. Onderdonk, *Supt*......Bonne Terre, Mo
E. B. Keyes, *M. C. B*..........Bonne Terre, Mo
St. Joseph & Western R. R.
4-8½ g. 252 m. 21 lo. 175 cars.
D. McCool, *Gen. Man*..........St. Joseph, Mo.
E. Sleepy, *M. M. & . C. B*....St. Joseph, Mo.
St. Joseph & Des Moines R. R. (*See K. C., St. J. & C. B.*)
St. Lawrence & Ottawa Ry. (*See Can. Pac.*)
St. Louis, Alton & Terre Haute R. R.
Main Line. (*See C., C., C. & I.; Ind. & St. L. Div.*
St. Louis & Cairo Div.: 4-8½ g 137 m. 19 lo. 800 c
G. W. Parker, *Gen. Man*.....E. St. Louis, Ill.
J. L. Hinckley, *Supt*..........Belleville, Ill
P. H. Murphy, *M. M*.........E. St. Louis, Ill.
St. Louis Bridge Co. and Tunnel R. R.
4-8½ g. 31 m. 22 lo. 11 cars.
Wm. Taussig, *Gen. Man*..........St. Louis, Mo
A. W. Dickinson, *Supt*............St. Louis, Mo.
J. E. Williams, Jr., *Pur. Agt*....St. Louis, Mo
Geo. W. Walshe, *M. M*............St. Louis, Mo.
St. Louis, C. Cœur & St. Ch. Ry. 3 g. 16 m.
F. M. Colburn, *Gen. Man*.........St. Louis, Mo.
St. Louis Coal R. R. 4-8½ g. 93 m. 10 lo. 217 cars.
Robt. Meek, *Supt*..............Carbondale, Ill.
Jas. C. Bryden, *Pur. Agt*........St. Louis, Mo.
St. Louis, Des Moines & Northern Ry. 4-8½ g. 43 m.
C. F. Merk, *Supt*..............Des Moines, Ia.
St. L., Ft. Scott & Wichita R. R. 4-8½ g. 214 m. 6 l. 337 c.
J. W. Miller, *V. P. & Gen. Man*..Fort Scott, Kan.
Tho. N. Lewis, *Asst. Supt*......Fort Scott, Kan.
Henry Berger, *M. M*............Ft. Scott, Kan.
St. L., Hannibal & Keokuk. 4-8½ g. 85 m. 5 lo. 70 c.
E. C. Case, *Rec. & Man*........Hannibal, Mo.
W. I. Brokaw, *M. M*..............Hannibal, Mo
St. Louis, Iron Mt. & So'n Ry. (*See Mo. Pac.*; (4) *Div.*)
St. L., Keokuk & No.-W'n. Ry. (*See C., B. & Q.*)
St. L., Salem & Little Rock. 4-9 g. 72 m. 5 lo. 111 c.
H. A. Crawford, *V. Pr. & P. A*...St. Louis, Mo.
E. B. Sankey, *Supt*..................Salem, Mo.
Thomas Everson, *M. M*...........Steelville, Mo
J. W. Houston, *M. C. B*...........Steelville, Mo.
St. Louis & Cairo R. R. 3 g. 152 m. 22 lo. 896 cars.
Chas. Hamilton, *Gen. Supt*......St. Louis, Mo.
E. J. Newell, *M. M*..............E. St. Louis, Mo.
St. L. & San Fran. Ry. 4-8½ g. 943 m. 103 lo. 3,737 c.
C. W. Rogers, *V. P. & Gen. Man*..St. Louis, Mo.
D. H. Nichols, *Supt. Tran*..No. Springfield, Mo.
A. P. Mann, Jr., *Pur. Agt*........St. Louis, Mo.
M. Kearney, *M. M. & C. B*..No. Springfield, Mo.
East Div.: A. Veech, *Supt*.........St. Louis, Mo
Central Div.: W. A. Thoms, *Supt*..Springfield, Mo.
Kan. Div.: J. R. Wentworth, *Supt*. Neodesha, Kan.
St. Martin's & Upham Ry. 4-8½ g. 30 m. 2 lo. 8 cars.
A. E. Killam, *Manager*........St. Martin's, N. B.
St. Paul Eastern Grand Trunk Ry. 4-8½ g. 15 m.
D. C. Lamb, *Gen. Supt*..........Oconto, Wis.
St. Paul, Minneapolis & Manitoba Ry.
4-8½ g. 1,402 m. 201 lo. 5,068 cars.
A. Manvel, *Gen. Man*..............St. Paul, Minn.
H. C. Ives, *Asst. Gen. Man*.. .. St. Paul, Minn.
E. B. Wakeman, *Asst. Gen. Supt*. St. Paul, Minn.
J. C. Morrison, *Pur. Agt*........St. Paul, Minn.
Thos. Downing, *M. M. & C. B*..St. Paul, Minn.
Breck. Div.: W. S. Kemp, *Supt*...St. Paul, Minn.
F. F. Div.: J. B. Rice, *Supt*........St. Paul, Minn.
No'n Div.: A. Guthrie, *Supt*.....Crookston, Minn.
St. Paul & Duluth R. R. 4-8½ g. 225 m. 37 lo. 1,080 c.
W. H. Fisher, *Gen. Supt*..........St. Paul, Minn.
J. G. Callahan, *Pur. Agt*........St. Paul, Minn.
Chas. F. Ward, *M. M. & M. C. B*..St. Paul, Minn.
State Line & Sullivan R. R. 8½ g. 25 m. 3 lo. 263 c.
I. O. Blight, *Supt*..................Towanda, Pa.
Staten Island R. R. ¾ g. 13 m. 4 lo. 18 c
J. W. Wilbur, *Supt*............New York, N. Y
Stony Clove & Catskill Mountain R. R.
3 g. 14 m. 2 lo. 22 cars.
Geo. Coykendall, *Gen. Supt*....Rondout, N. Y
Stony Creek R. R. 4-8½ g. 103 m.
Geo. B. Boggs, *Supt*..........Norristown, Pa.
Sterling Mountain Ry. 6 g. 8 m. 2 lo. 145 cars.
J. C. Missimer, *Supt*..........Sloatsburg, N. Y.
Suffolk Lumber R. R. 3 g. 15 m. 3 lo. 41 cars.
W. M. Whaley, *Supt*..............Suffolk, Va.
Summit Branch R. R. 4-9 g. 20 m. 7 lo. 10 cars.
Thomas Gucker, *Supt*......Williamstown, Pa.
Susquehanna & Delaware River R. R. In progress.
D. Y. Kilgore, *Pres*............Philadelphia, Pa.
Sussex R. R. (*See Del., Lack. & West.*)
Syracuse, Binghamton & N. Y. R. R. (*See D. L. & W.*)
Syr., Ontario & N. Y. R. R.
Albert Allen, *Supt*..............New York, N. Y.
Syracuse, Geneva & Corning
(*See Fall Brook Coal Co.*)

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Tennessee Coal R. R. 5 g. 28 m. 8 lo. 204 cars.
A. M. Shook, *Gen. Man*......Tracy City, Tenn.
W. A. Knight, *M. M*.........Tracy City, Tenn.
Tennessee & Sequatchee Valley R. R.
3 g. 42 m. 1 lo. 24 cars.
Chas. Clinton, *Gen. Supt*....Spring City, Tenn.
P. V. Mooney, *Pur. Agt*......Spring City, Tenn.
Terre Haute & Indianapolis R. R.
4-9 g. 421 m. 105 lo. 4,318 cars.
Joseph Hill, *Gen. Supt*........St. Louis, Mo.
C. R. Peddle, *P. Agt*.........Terre Haute, Ind.
Geo. H. Prescott, *S. M. P. & M.* Terre Haute, Ind.
F. C. Cleaver, *M. M*.........Terre Haute, Ind
E. D. Carter, *M. C. B*......Terre Haute, Ind.
Chas. Butler, *M. M*..............Effingham, Ill.
Clinton Idler, *Foreman*....Indianapolis, Ind.
Terre Haute & So.-Eastern Ry. 4-9 g. 44 m. 2 lo. 145 c.
Geo. Atherton, *Supt*..........Terre Haute, Ind.
Texas-Mexican Ry. (*See Mex. Nat.*)
Texas Trunk R. R. 4-8½ g. 36 m. 2 lo. 8 cars.
Hugh Irwin, *Gen. Supt*..............Dallas, Tex.
Texas Western Ry. 3 g. 52 m. 2 lo. 41 cars.
Henry Hatch, *Gen. Man*........Houston, Tex.
T. F. Glispin, *M. M*...............Houston, Tex.
Texas & N. O. R. R. (*See Cen. Pac.; G. H. & S. A. Div.*)
Texas & Pacific. (*See Mo. Pac. Ry.*; (6) *Div*
Texas & St. Louis Ry. 3 g. 769 m. 84 lo. 2,000 cars.
S. W. Fordyce, *Rec. and Gen. Man*. St. Louis, Mo.
C. S. Brooke, *Pur. Agt*..........St. Louis, Mo.
M. C. B..........Pine Bluff, Ark.
Mo. & Ark. Div.:
J. W. Brown, *Supt*..........Pine Bluff, Ark.
Rich. Williams, *M. M*.......Pine Bluff, Ark.
Tex. Div.. J. W. Dickinson, *Supt*....Tyler, Tex.
W. J. Lewis, *M. M*.....................Tyler, Tex.
Tionesta Valley R. R. 3 g. 15 m.
George Dickinson, *Gen. Supt*.....Sheffield, Pa.
Tioga R. R. 4-8½ and 6 g. 67 m. 18 lo. 960 cars
L. H. Shattuck, *Supt*............Blossburg, Pa.
J. C. Guthrie, *Pur. Agt*......New York, N. Y.
Pere Bonny, *M. M*................Blossburg, Pa.
D. H. Stratton, *M. C. B*.........Blossburg, Pa.
Toledo, Ann Ar. & No. Mich. Ry.
4-8½ g. 63 m. 9 lo. 186 c.
J. M. Ashley, *Gen. Man*.......Ann Arbor, Mich.
H. W. Ashley, *Supt. & Pur. Agt*. do
C. C. Dodge, *M. M*............Ann Arbor, Mich.
Toledo, Cin. & St. Louis R. R. 3 g. 798 m. 101 lo. 3,500 c.
W. H. Pettibone, *Gen. Supt*.........Toledo, O.
F. W. Stewart, *P. Agt*..................Toledo, O.
Thos. Robertson, *M. M*..........Delphos, O.
Toledo Div.: W. H. Vandergrift, *Supt*.; do
J. S. Wiers, *For. Car Rep*........Delphos, O.
St. Louis Div.: Frank F. Allen....Charleston, Ill.
P. H. Murphy, *M. M*..........Charleston, Ill.
Toledo, Peoria & Western R. R. 4-8½ g. 223 m.
E. N. Armstrong, *Supt*..............Peoria, Ill.
Toledo & Indianapolis R. R. 4-8½ g. 43 m. 4 lo. 118 c.
David Robison, Jr., *Rec*..............Toledo, O.
Toledo & Ohio Central R. R.
4-8½ g. 325 m. 46 lo. 4,760 cars.
T. M. Peelar, *Supt*...................Bucyrus, O
F. W. Stewart, *Pur. Agt*..............Toledo, O.
J. B. Morgan, *M. M*...................Bucyrus, O.
Tonawanda Val. & Cuba R. R. (*See Brad., B. & K.*)
Toronto, Grey & Bruce Ry. (*See Canadian Pacific.*)
Toronto & Nipissing Ry. (*See Mid. Ry. of Can.*)
Troy & Boston R. R. 4-8½ g. 48 m. 20 lo. 484 cars.
D. Robinson, *Pres*..........................Troy, N. Y.
Joseph Crandell, *Supt*.................Troy, N. Y.
C. H. Hubbell, *Pur. Agt*..............Troy, N. Y.
Z. B. Davis, *M. M*........................Troy, N. Y.
A. Brewer, *M. C. B*......................Troy, N. Y.
Troy & Greenfield R. R. & H. Tunnel. 4-8½ g. 44 m.
A. W. Locke, *Man*.........North Adams, Mass.
Tuckerton R. R. 4-9 g. 31 m. 2 lo. 29 cars
J. J. Pharo, *Supt. & Pur. Agt*. Tuckerton, N. J.

U

Ulster & Delaware R. R. 4-8½ g. 74 m. 10 lo. 218 cars.
Jas. H. Jones, *Supt*..............Rondout, N. Y.
John H. Decker, *M. C. B*.........Rondout, N. Y.
Union Ry. 5 g. 9 m. 3 lo.
C. E. James, *Pres*.........Chattanooga, Tenn.
D. J. O'Connell, *Gen. Man*. Chattanooga, Tenn.
Union Pacific Ry. (7 Gen. Divs.)
3 & 4-8½ g. 4,633 m. 510 lo. 10,550 cars.
S. R. Callaway, *Gen. Man*..........Omaha, Neb.
S. T. Smith, *Gen. Supt*..............Omaha, Neb.
Thos. L. Kimball, *Asst. Gen Man*. Omaha, Neb.
J. J. Burns, *Gen. Store Keeper*...Omaha, Neb.
I. H. Congdon, *S. M. P. & C. D*...Omaha, Neb.
John Wilson, *Asst. do*.................Omaha, Neb.
(1) Neb. Div.: O. H. Dorrance, *Gen. Supt*. Omaha, Neb.
E. Div.: C. B. Havens, *Supt*.........Omaha, Neb.
J. H. McConnell, *M. M*..............Omaha, Neb.
A. M. Collett, *M. C. B*..............Omaha, Neb.
L. Pole Div.: W. A. Deuel, *Supt*..Cheyenne, W. T.
J. H. McConnell, *M. M*.........N. Platte, Neb.
(2) Wy. Div.: E. Dickenson, *Gen. Supt*..Laramie, W. T.
T. A. Davis, *M. M*...............Laramie, W. T.
Wes. Div.: C. E. Wurtelle, *Supt*. Evanston, W. T.
Geo. F. Chapman, *M. M*.......Evanston, W. T.
(3) Idaho Div.: R. Blickenderfer, *Gen. Supt*. Ogden, U.
John S. Hickey, *M. M*...........Shoshone, Id.
Ogden Short Line Div.:
R. Blickensderfer, *Supt*........Pocatello, Id.
Utah & Northern Div.:
J. S. Hickey, *M. M*..........Eagle Rock, Id.
J. W. Paul, *Gen. For. C. D*...Eagle Rock, Id.
(4) Col. Cent. Div.: A. A. Egbert, *Gen. Supt*. Denver, Col.
E. Dickinson, *Asst. Gen. Supt*.....Denver, Col
F. Mertsheimer, *M. M*.........Denver, Col.
C. C. Div.: P. Touhy, *Supt*..........Denver, Col.
So. Park Div.: J. T. Choate, *A. Supt*..Como, Col.
(5) Kan. Div.: H. O. Brinkerhoff, *G. Supt*. Kan. City, Mo.
K. Pac. Div.: J. O. Brinkerhoff, *Supt*. Kan. C'y, Mo.
J. O. Chapman, *M. M*......Armstrong, Kan.
T. B. Roberts, *M. C. B*......Armstrong, Kan.
Kansas Central Div.:
J. O. Brinkerhoff, *Supt*..Leavenworth, Kan.
Smoky Hill Div.:
O. H. Dorance, *Supt*...........Wallace, Kan.
J. B. Dailey, *Asst. M. M*..........Ellis, Kan.
6 Salt Lake & Western Div.:
W. W. Ritter, *Supt*......Salt Lake City, Utah.
United States Rolling Stock Co. 19 lo. 4,692 cars.
A. Hegewisch, *Pres*............New York, N. Y.
W. H. Chaddock, *Gen. Agt*........Chicago, Ill.
Utah Central Ry. 4-8½ g. 280 m. 21 lo. 358 cars.
John Sharp, *Gen. Supt*...Salt Lake City, Utah.
S. H. Hill, *Pur. Agt*....Salt Lake City, Utah.
Geo. G. Bywater, *M. M*..Salt Lake City, Utah
Peter Reid, *M. C. B*.......Salt Lake City, Utah.
Utah & Nevada Ry. 3 g. 37 m. 3 lo. 33 cars
W. W. Ritter, *Gen. Man*...Salt Lake City, Utah.
Robert Anderson, *M. M*...Salt Lake City, Utah.
Utah & Northern Ry. (*See Union Pac.*; (3) *Div.*)
Utah & Pleasant Valley Ry. (*See Den. & Rio. Gr.*)
Utica, & Black Riv. R. R. 4-8½ g. 180 m. 25 lo. 412 c.
E. A. Van Horne, *Gen. Supt. & P. A*., Utica, N. Y.
H. W. Hammond, *Asst. Supt*.......Utica, N. Y.
John Bailey, *M. M*..................Utica, N. Y.
David James, *M. C. B*..............Utica, N. Y.

V

Vaca Vall. & Clear Lake R. R. 4-8½ g. 30 m. 2 lo. 19 c.
G. B. Stevenson, *Gen. Supt*.......Vacaville, Cal.
Valley Ry. (Ohio) 4-8¾ g., 75 m. 20 lo. 889 cars.
Isaac Reynolds, *Gen. Man*........Cleveland, O.
H. Melcher, *Pur. Agt*..............Cleveland, O.
C. T. Johns, *M. M*..................Cleveland, O.
Valley R. R. Va. 4 8½ g. 62 m
S. Spencer, *Pres*..................Baltimore, Md.
Vicksburg & Brunswick R. R. (*See Cen. of Ga.*)
Vicksburg & Meridian R. R. (*See Cin., N. O. & Tex. Pac.*)
Vicks. Shreveport & Pac. R. R. (*See C., N. O. & T. P.*)
Victoria Ry. (*See Midland Ry. of Can.*)
Virginia Midland Ry. (*See Rich. & Dan.*; (4) *Div.*)
Virginia & Truckee R. R. 4-8½ g. 52 m. 14 lo. 322 c.
Carson & Colorado R. R. 3 g. 294 m. 8 lo. 228 c.
H. M. Yerington, *Gen. Supt*.......Carson, Nev.
R. J. Laws, *A. Supt*. (C. & Col.) Hawthorne, Nev.
Hume Yerington, *Pur. Agt*........Carson, Nev.
I. N. Fording, *M. M*..............Carson, Nev.
M. M. Hyde, *M. C. B*.............Carson, Nev.

W

Wabash, Chester & W'n R. R. (*See St. Louis Coal.*)
Wabash, St. Louis & Pacific Ry. (4 Gen. Divs.)
4-8½ g. 3,241 m. 598 lo. 17,230 cars.
Jas. F. Joy, *Pres*....................St. Louis, Mo.
A. L. Hopkins, *V. P*..............St. Louis, Mo.
A. A. Talmage, *Gen. Man*......St. Louis, Mo.
H. H. Wellman, *Pur. Agt*........St. Louis, Mo.
J. B. Barnes, *Supt. M. P. & M*. Springfield, Ill.
M. M. Martin, *Supt. Car Dept*.....Decatur, Ill.
F. Howard, *M. C. B*...................Toledo, O
(1) Eas'n Div.: G. W. Stevens, *Supt*........Peru, Ind.
W. S. Morris, *M. M*.........Fort Wayne, Ind.
A. W. Quackenbush, *Asst. M. M*.. Peru, Ind
Thos. Anderson, *M. C. B*...........Peru, Ind.
(2) Middle Div.: K. H. Wade, *Supt*......Decatur, Ill.
C. F. Lape, *M. M*...............Springfield, Ill.
B. B. Rose, *M. C. B*..................Decatur, Ill.
G. A. Hurd, *Asst. Supt*.............Decatur, Ill.
E. B. Hyde, *Asst. Supt*..............Havana, Ill.
(3) Western Div.: R. G. Butler, *Supt*....Moberly, Mo
J. K. Lape, *M. M*....................Moberly, Mo.
John Lang, *M. C. B*..................Moberly, Mo.
D. Moin. Div.: C. F. Meek, *A. Supt*. Des Moines, Ia
Walden's Bridge R. R. 3 g. 23 m. 3 lo. 37 cars.
John G. Scott, *Gen Man*....Jenks P. O., Tenn.
Wallkill Valley.
J. E. Childs, *Gen. Supt*.........New York, N. Y.
Geo. H. Graves, *Supt*..........Kingston, N. Y
E. Minshull, *M. M*...........Middletown, N. Y.
I. W. Fowler, *Pur. Agt*.....Middletown, N. Y.
Walla Walla & Columbia Riv. R. R. (*See Ore. Ry.*)
Walton R. R. 5 g. 10 m. 1 lo. 7 cars.
D. H. Walker, *Pres*..................Monroe, Ga.
Warren & Farnsworth Valley R. R.
3 g. 16 m. 3 lo. 39 cars.
A. D. Wood, *Gen. Man*..............Warren, Pa
Warwick Valley R. R. (*See Leh. & Hud. River.*
Washington, Ohio & West. R. R. 4-8½ g. 52 m. 5 lo. 87 c
S. M. Brophy, *Supt*...............Alexandria Va
W. Mountjoy, *Act. For*...........Alexandria, Va
John Harrison, *M. C. B*..........Alexandria, Va
Waynesburg & Washington Rd. 3 g. 29 m. 3 lo.
C. E. Bower, *Supt*.................Waynesburg, Pa
A. M. Kline, *M. C. B*.............Waynesburg, Pa
Welland Ry. 4-8½ g. 25 m. 4 lo. 147 cars
William Pay, *Supt*..........St. Catharines, Ont
Jas. Taylor, *M. M*.........St. Catharines, Ont
Wm. H. Pay, *M. C. B*......St. Catharines, Ont
West Feliciana R. R. 4-8½ g. 27 m. 2 lo. 22 cars
J. B. McGehee, *Pr. & Gen. Supt*. Bayou Sara, La
J. A. Tilton, *M. M. & C. B*.......Bayou Sara, La
W. Va., Central & Pittsb'g Ry. 4-8½ g. 50 m. 4 lo. 119 c
T. B. Davis, *Gen. Man*.......Piedmont, W. Va
W. E. Porter, *Gen. Supt*......Piedmont, W. Va.
Geo. W. Harrison, *Pur. Agt*...Piedmont, W. Va
E. W. Lippencott, *M. M*.....Piedmont, W. Va.
West & East R. R. (*See Ill. Cen.; N. O. Div.*)
West Jersey R. R. (*See Penn. R. R.*; (3) *Div.*)
Western R. R. (of Ala.) 5 g. 85 m. 15 lo. 270 cars.
Atlanta & W. Point Rd. 5 g. 87 m. 14 lo. 240 c.
Cecil Gabbett, *Gen. Man. & Supt*...Mont., Ala.
C. D. Wall, *M. M. & C. B*....Montgomery, Ala
Western Counties' Ry. 4-8½ g. 67 m. 8 lo. 137 cars.
J. Brignell, *Supt*.................Yarmouth, N. S.
Western Maryland R. R. 4-8½ g. 127 m. 28 lo. 610 c.
J. M. Hood, *Pr. & Gen. Man*....Baltimore, Md.
R. J. Adair, *Pur. Agt*.............Baltimore, Md.
David Holtz, *Mast. of Mach*..Union Bridge, Md.
J. H. Nussear, *M. C. B*.......Union Bridge, Md.
Western No. Carolina R. R. 5 g. 210 m. 17 lo. 160 c.
Peyton Randolph, *Asst. G. M*..Salisbury, N. C.
V. E. McBee, *Supt*..................Salisbury, N. C.
Jos. P. Minetree, *Pur. Agt*......Richmond, Va.
G. W. Gates, *M. M*.................Salisbury, N. C.
Western & Atlantic R. R. 5 g. 138 m. 58 lo. 952 c.
R. A. Anderson, *Gen. Supt*.........Atlanta, Ga.
A. B. Bostwick, *Asst. Supt*.......Atlanta, Ga.
Lamar Collier, *M. M*...............Atlanta, Ga
Wm. Kinyon, *M. C. B*.............Atlanta, Ga.
Wheeling, Pittsburg & Baltimore R. R. (*See B. & O.*)
Wheeling & Lake Erie R. R. 267 m. 37 lo. 1,922 c.
M. D. Woodford, *Rec. & Gen. Man*..Toledo, O.
O. P. Dunbar, *Gen. M. M*...........Norwalk, O.
John Hillhouse, *Div. M. M*.........Norwalk, O.
Cleve. & Mar. Div.: P. Pease, *Rec. & Gen. Man.*
Alex. Galloway, *M. M*.........Cambridge, O
Whitby, Port Perry & Lindsay Ry. (*See Mid. of Can.*)
White Water R. R. (*See Ft. W., Cin. & Lou.*)
Whitefield & Jefferson R. R. (*See Bos., Con. & Mon.*)
Whitneyville & Machiasport R. R. 8 m. 2 lo. 48 c.
C. Sullivan, *G. M. & Pur. Agt*. Whitneyville, Me.
Wicomico & Pocomoke R. R. 4-8½ g. 30 m. 2 lo. 38 c.
L. Showell, *Pres*.........................Berlin, Md.
Williamsport & North Branch R. R.
4-8½ g. 14 m. 2 lo. 4 cars.
B. G. Welch, *Man. & P. Agt*...Hughesville, Pa.
Williamstown & Del. River R. R.
4-8½ g. 27 m. 1 lo. 12 cars.
Samuel Garwood, *Supt*....Williamstown, N. J
Wilmington, Columbia & Augusta R. R. (*See W. & W.*)
Wilmington & No'n R. R. 4-8¾ g. 85 m. 17 lo. 155 c.
A. G. McCausland, *Supt. & P. A*. Wilmington, Del
George Rommel, *M. M*........Wilmington, Del.
Alex. Maitland, *M. C. B*......Wilmington, Del.
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H. Walters, *Gen. Man*..........Baltimore, Md.
J. F. Divine, *Gen. Supt*.......Wilmington, N. C.
John Bisset, *M. M*...........Wilmington, N. C.
W. H. Day, *M. C. B*..............Florence, S. C.
J. H. Davis, *M. C. B*. (W. & W.). Wilmington, N. C.
Winifrede R. R. 4-9 g. 5 m. 1 lo. 65 cars.
Theodore Wright, *Pres*........Philadelphia, Pa.
Windsor & Annapolis Ry. 4-8½ g. 130 m. 10 lo. 160 c.
P. Innes, *Gen. Man*..............Kentville, N. S.
Wm. Yould, *M. M*................Kentville, N. S.
Wm. Grierson, *M. C. B*..........Kentville, N. S.
Wisconsin Central R. R. 4-8½ g. 480 m. 49 lo. 1,800 c
F. N. Finney, *Gen. Man*........Milwaukee, Wis.
A. A. Allen, *Asst. Gen. Man*..Milwaukee, Wis.
E. K. Howes, *Pur. Agt*........Milwaukee, Wis.
H. A. Barnes, *M. M*............Stevens Pt., Wis.
Mil. East. & No. Divs.:
F. A. Merrill, *Supt*............Milwaukee, Wis.
Wis. & Minn. and Minn. St. C. & Wis. R. R.'s.:
G. T. Wiswell, *Supt*......Chippewa Falls, Wis.
Mid. & No. Div.: P. Walling, *Supt*. Mil'ukee, Wis
Wisconsin, Iowa & Nebraska.
G. C. McMichael, *Supt*.......Marshalltown, Ia.
J. V. Johnston, *Pur. Agt*.....Marshalltown, Ia.
M. C. Wheeler, *M. M*........Marshalltown, Ia.
Wisconsin & Michigan R. R. (*See Mil. & North'n.*)
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Woodruff Sleeping & Parlor Coach Co.
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J. C. Paul, *Gen. Man*..........Philadelphia, Pa.
R. A. Rutherford, *Supt*.......Philadelphia, Pa.
Wood River Branch R. R. 4-8½ g. 6 m. 2 lo. 3 cars.
L. M. Barber, *Supt*............Hope Valley, R. I.
Woodstock R. R. 4-8½ g. 14 m. 1 lo. 3 cars.
J. G. Porter, *Supt*..............Woodstock, Vt.
Worcester, Nashua & Rochester R. R.
4-8½ g. 95 m. 20 lo. 523 cars.
Chas. Howard, *Gen. Man*....Worcester, Mass.
G. W. Hurlburt, *Supt*.........Worcester, Mass.
A. R. Barrett, *M. M. & C. B*. Worcester, Mass
Worcester & Shrewsbury R. R. 3 g. 3 m. 3 lo. 9 c.
J. F. Bigelow, *Supt*............Worcester, Mass.
G. E. Hapgood, *Pur. Agt*....Worcester, Mass.
Chas. Cleveland, *M. M*........Worcester, Mass.
Worcester & Somerset R. R. (*See N. Y., Phil. & Nor.*)

Y

York & Peach Bottom Ry. 3 g. 40 m. 5 lo. 100 c.
S. M. Manifold, *Supt. & Pur. Agt*.....York, Pa.
G. W. Hoover, *M. M*.....................York, Pa.

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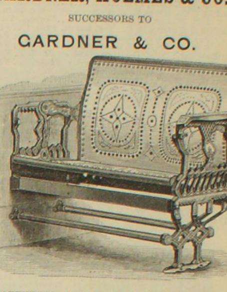

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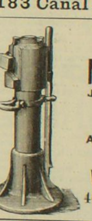

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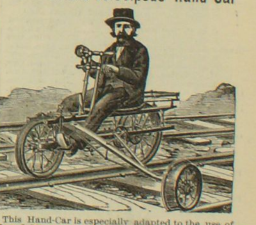

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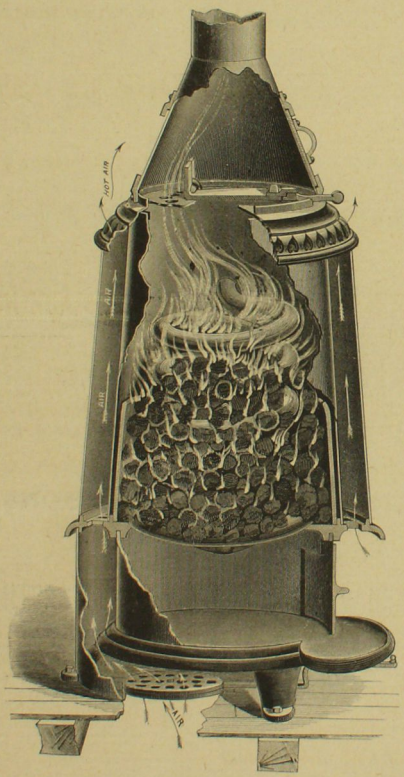

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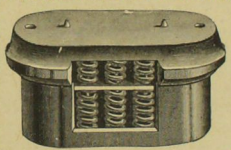

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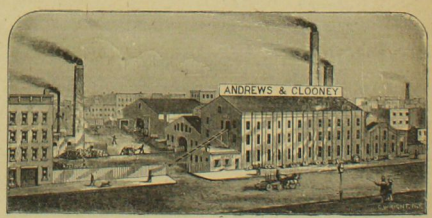

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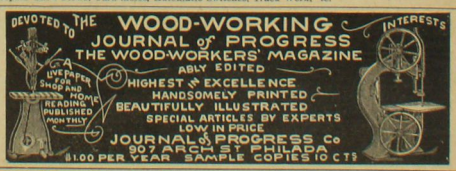

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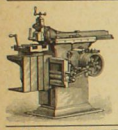

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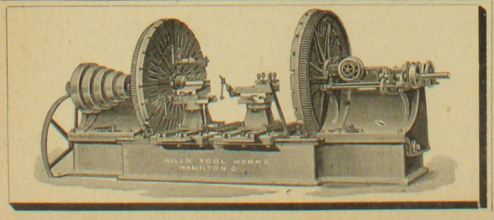

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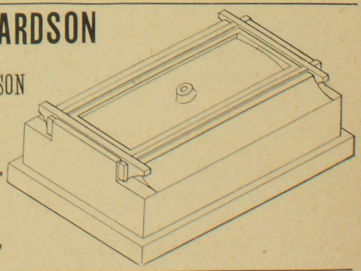

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